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An Ancient Text of the Gospel of Mark

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IN THE YEAR 1937, the University of Chicago purchased, from an anonymous kinsman of an anonymous dealer, a small manuscript of the Gospel of Mark in Greek. Although probably no earlier than the fourteenth century in the date of its actual writing, it contains the text of the Gospel in a form which further study may prove to be the earliest form now extant. This little book written in a coarse hand contains seventeen illustrations or miniatures. It is our custom at Chicago to christen each newly acquired manuscript of the Greek New Testament. Some have been named for scribes, some for former owners, some for their places of origin, and some for donors. Since each manuscript, like each person, is an individual, names seem more appropriate to them than numbers. In the University's collection, the following are characteristic names: The

Argos Lectionary, The Chrysanthus Gospels, The Gospels of the Fluting Shepherd, The Elizabeth Day McCormick Apocalypse, and The Red Gospels of Ganjasar. But for the new manuscript, we did not know the scribe's name, nor a former owner's name, nor the place of origin, nor was it the gift of a single donor. For a time we dallied with the idea of naming it "The Kolobodaktylos Mark" or "the stub-fingered Mark" from the coarseness of the script. But we reluctantly abandoned this euphonious polysyllable as too obscure in its reference to be effective. We noted as we began the study of the manuscript that it was very late in origin but very early in the nature of its content and its miniatures. On these grounds we decided to christen it "The Archaic Mark."[1]

The Archaic Mark is unimpressive in appearance. It is small and thin. It contains only 44 folios, 88 pages. The pages measure 11.5 cm. by 8.5 cm. (4-9/16 inches by 3-3/8 inches). The covers are dilapidated, dull brown goatskin, blind stamped in a simple design. A study of the design shows that this cover was made for a larger manuscript and was re-used to cover the Chicago Mark. It is so worn that it suggests the ten-cent bargain table in a second-hand book store rather than the Rare-Book Room.

The parchment itself is of a poor grade, uneven in thickness, now spotted with a moldy brown color. One double folio (fol. 17 & 24) was originally ruled for a larger manuscript; the original ruling can be seen at right angles to the lines of the present text. The script itself is irregular and crude, and is not to be compared with the Byzantine minuscule book hand. In general, this script gives an impression of unevenness and lack of discipline. The number of lines to a page varies frequently—even on the same page or on facing pages.

[1] This codex is MS 972 in the University of Chicago Library. It was assigned the number 2427 by Eltester in the Gregory list. Some references to its miniatures were published by H. R. Willoughby in *The Rockefeller-McCormick New Testament* (Chicago: University of Chicago Press, 1932), III, 124-125, Pl. XLII, and in *The Four Gospels of Karahissar* (Chicago: University of Chicago Press, 1936), II, 137, 139, 144, 155, 240-241, 293-294, 345. K. W. Clark gives a brief description of it in his *A Descriptive Catalogue of Greek New Testament Manuscripts in America* (Chicago: University of Chicago Press, 1937), 271. My colleagues, Harold R. Willoughby, Allen P. Wikgren, and I are studying the miniatures and text of the manuscript with a view to complete publication in the near future. Dr. Merrill Parvis, Research Assistant in New Testament, is rendering valuable assistance to all of us, but especially to me.

Even the series of seventeen miniatures[2] is not very impressive—unless it be to the eye of the iconographer. To the amateur's eye, these miniatures appear to be low-grade work, below the high level of the Byzantine period. In short, the Archaic Mark is not a deluxe manuscript; its appearance does not warrant its admission to the select circle of such brilliant codices as the Rockefeller-McCormick New Testament, the Book of Kells, or the Golden Gospels in the Morgan Library.

This none-too-impressive manuscript is exceedingly anonymous. It has no colophon such as those which sometimes conclude a manuscript with a record of the scribe's name and the date and place of origin. There is not a single marginal note of any kind. The script is so unusual that it tells us very little in comparison with others. There is no previous history of this codex in scholarly publications. The covers themselves can be dated about A.D. 1700; but since they were not made for this manuscript, they cannot tell us anything about its origin. The pictures alone suggest a date and place. Dr. Willoughby is inclined to place them in upper Anatolia, and to date them as not earlier than A.D. 1300. In these miniatures Moses has a beard, and he did not grow a beard in the late Byzantine period until the fourteenth century. But there is little more than the beard of Moses by which to date the book. On the basis of a photograph, Kirsopp Lake was inclined to put it anywhere between the fifteenth and the twentieth centuries, but after looking at the manuscript itself said that it might be as early as the thirteenth century.

Yet this anonymous and unimpressive manuscript is in several areas either distinctive or unique. Its cycle of seventeen pictures—sixteen of them text illustrations—is without a complete parallel in Greek manuscripts. Several of the miniatures do not occur in any other Greek manuscript of the Gospel of Mark. Furthermore, the presence of Johannine elements in several of the miniatures adds to the unusual nature of the cycle.

[2] Fol. 1v The Evangelist Mark, 4v Peter's Mother-in-law, 5v Paralytic, 12r Jairus' Daughter, 15v The Five Thousand, 19v The Blind Man, 21r Transfiguration, 27v Triumphal Entry, 34v Last Supper, 37v Christ before Pilate, 38r Christ or Barabbas?, 38v Christ Mocked by Soldiers, 39r Simon Carries the Cross, 39v The Crucifixion, 40r Division of Christ's Clothing, 41v Pilate Allows Joseph to Bury Jesus, 42r Women at the Tomb.

The script of the manuscript is more than unusual; it is unique. The scribe of the Chicago Mark had several habits to which we cannot find parallels anywhere, and others to which no parallel exists in Greek manuscripts. He divides his text into words and even puts periods after abbreviations. These actions seem entirely normal to the twentieth-century American, but were unknown in the Greek manuscript tradition. Out of seventy-seven manuscripts photographed by W. H. P. Hatch on Mount Sinai, only one has word division, and it has other elements which suggest that it may be copied from the Greek text of a bilingual. In the large collection at Jerusalem, two manuscripts have word division, and both were written in the eighteenth century.[3]

Again the scribe of Manuscript 2427 frequently abbreviates the definite article—either by writing the tau(t) alone, or by writing tau and an acute accent, or by writing tau with horizontal stroke above it, or by following it with a period. This we have not seen elsewhere. Except for the period, these abbreviations of the article occur in non-literary documents of the early centuries of the Christian era. Professor Sanders of Michigan thought this primitive usage might explain (through error) the use of the letter epsilon (e) for the article in a few passages of the Berlin Genesis, a manuscript of the second half of the third century. In this same third-century codex we find the only parallel—and that not exact—to the Archaic Mark's habit of doubling a consonant by a superior stroke.[4] No medieval Greek manuscript known to us contains even a remote parallel to these usages of the Chicago Mark.

In still another set of abbreviations, the new manuscript agrees with very early usage against all the medieval witnesses. The Biblical manuscripts of the middle ages abbreviate thirteen words in the Greek text of Mark by contraction, *i.e.*, by omitting the middle of the word. These words are the *nomina sacra*, or religious

[3] See Plates in W. H. P. Hatch, *The Greek Manuscripts of the New Testament at Mount Sinai* (Paris: Librairie Orientaliste Paul Geuthner, 1932), Pl. XIX, and *The Greek Manuscripts of the New Testament in Jerusalem* (Paris: Librairie Orientaliste Paul Geuthner, 1934), Pl. LXV, LXVI.

[4] H. A. Sanders and Carl Schmidt, *The Minor Prophets in the Freer Collection and the Berlin Fragment of Genesis*, University of Michigan Studies, Humanistic Series, Volume XXI (New York: Macmillan, 1927), 238-240.

terms: God, Lord, Jesus, Christ, Son, Spirit, David, Cross, Mother, Father, Israel, Man, Heaven. But a few very early witnesses treat only four words as *nomina sacra:* God, Lord, Jesus, and Christ. In the Archaic Mark these are the only words regularly treated as *nomina sacra,* although Father, Son, and Man are occasionally treated this way. The absence of Spirit from this group in our manuscript is an indication of primitive usage. Another primitive element with early parallels is the inclusion of words as *nomina sacra* which are not so treated in medieval manuscripts: Holy, Disciple, King, and John.

Beyond all this, our scribe had the habit of linking certain letters in unusual ways, and even of linking letters not elsewhere united. The detailed description of these must await a more exhaustive and duller treatment than this, but it may be pointed out that he links the letter "o" (omicron) to a following "i" (iota) by a horizontal stroke which transforms the omicron into a sigma. The number of unusual ligatures suggests that he may not have known Greek or, at least, not well.

But it is the nature of the content, the Greek text of the Gospel, which gives the Archaic Mark its major claim to distinction. It is close to a very early form of the text. This text—published, for example, by Westcott and Hort in 1881—is sometimes called the "Neutral Text" or the "Alexandrian Text"; in studying it, we have found it useful to follow Sir Frederic Kenyon in calling it the Beta-Text. This Beta-Text is at least as early as the third century, and is the text commonly in use in our classrooms.

The sources for our knowledge of this Beta-Text are: Codex Sinaiticus (Aleph), 4th century; Codex Vaticanus (B), 4th century; Codex Ephrem Rescriptus (C), 5th century; Codex Regius (L), 8th century; Codex Sangallensis (Delta), 9th century; Codex Laurensis (Psi), 8th or 9th century; Codex 33, 8th or 9th century; Codex 157, 12th century; Codex 517, 11th or 12th century; Codex 579, 13th century; Codex 892, 10th century; Codex 1241, 12th or 13th century; Codex 1342, 12th or 13th century; Sahidic version, probably 3rd century; and, Bohairic version, 4th century or shortly thereafter.

The closeness of the Chicago Mark to this Beta-Text is demonstrated by a series of comparisons. Taking the eleventh chapter of the Gospel as a sample, we counted all the variations between the Archaic Mark and various texts. It varies from the Beta-Text (as published by Westcott and Hort) only twenty-four times. But when it is compared with the so-called Received Text (Kenyon's Alpha-Text, which lies behind the King James version), seventy-eight variants appear. Moreover, our manuscript is even further from two other forms of the text, varying one hundred and eight times from the "Caesarean" text, and one hundred and seventeen times from the "Western" (Delta) text as it appears in the famous Codex Bezae. This makes it clear that the Archaic Mark is closely related to the Beta-Text.

A generation ago, E. A. Hutton published at Cambridge a list designed to establish objectively the relationship of an individual manuscript to the three main forms of the text—the Beta-Text, Alpha-Text, and Delta-Text.[5] He lists thirty Beta-Text readings in the Gospel of Mark; the Chicago Mark reads 28 of them—compared with B 29, L 28, Aleph 27, Delta 22, etc.

Our investigation of the relationship of manuscript 2427 to the Beta-Text has underlined the difficulty of working with the concept "Text." We hope to publish an edition of the Beta-Text after we have completed our study of the Archaic Mark. But we confess that we are still baffled by fundamental problems in this area, and the toughest one is to find an adequate definition of the term "The Beta-Text." Does this mean the text of the "best" witness?—or the text read at any one place by a majority?—or the text read by the main stem in a reconstructed family tree?—or the text which intrinsic probability supports as the original of the Beta-Text?

The answers to some of these questions still escape us, but we are sure that the family trees can be cut down and used for firewood so far as the Beta-Text is concerned. Each manuscript in this group has a step-father as well as a father. They have a multiple or mixed ancestry. Moreover, they are no closer than forty-second cousins or great-great-uncles. This promiscuity and other gaps in

[5] E. A. Hutton, *An Atlas of Textual Criticism* (Cambridge: University Press, 1911).

the generations baffle the constructor of family trees. In short, we are dealing not with a family, closely knit in intimate relationships, but with a nation; and this nation is a melting pot in which various metals have been placed. The Beta-Text manuscripts are recognizably kinfolk because they have big ears, black eyes, and small feet. Some of them have big ears, and small feet, and blue eyes; some have black eyes, big ears, and big feet. The confusion is confounded by the fact that some of these features appear among non-Beta manuscripts. The Beta-Text was undoubtedly a potent ancestor of the Alpha-Text, and at least a first cousin of the Delta-Text.

Scholarship in this field has long abandoned the counting of noses as means of determining an "original" reading; therefore, we hesitate to urge that the reading of a majority of Beta manuscripts be accepted in each case. Like the selection of the "best" manuscript, this tends toward reasoning in a circle. The same must be said for decision on grounds of intrinsic probability or internal evidence. How does one decide probabilities in regard to the character of a text before one knows what the text is? We are glad to leave these questions with the sage observation of Prebendary Miller in the Oxford debate on textual criticism in 1897, *"Dolus latet sub verbo* Text" (Deception lurks in the word "text").

In this area of great confusion, we have established a few landmarks. The first one is that the Archaic Mark is closer to the most famous Beta manuscript, the distinguished Codex Vaticanus, than to any other. Moreover, no other Beta manuscript is as close to Vaticanus as the Archaic Mark is. Our first landmark, therefore, is the close kinship of Manuscript 2427 and Vaticanus; these two we would put at one end or side or top of the Beta-Text.

In the Gospel of Mark there are only 188 readings of any significance (with support in other manuscripts) in which Manuscript 2427 differs from Codex Vaticanus. In the majority of cases, our manuscript diverges from the Beta-Text group when it varies from Vaticanus. There is, therefore, an alien element in the Chicago Mark. But the degree of its intimacy with the Vatican manuscript can be seen by using evidence which Hoskier compiled to establish

differences between Vaticanus and Sinaiticus. His evidence included a list of seventy-three readings which occur in Vaticanus but not in Sinaiticus nor elsewhere. The Archaic Mark reads forty-six of the seventy-three! Other evidences of close kinship appear in numerous passages where these two manuscripts agree with only scattered support from other sources.

Since we have already mentioned the existence of at least 188 variations from Vaticanus in the Chicago Mark, it is hardly necessary to argue that one of these manuscripts was not copied from the other. The most striking large variant is the presence of Mark 16:9-20 in the Archaic Mark and its absence from Vaticanus.

Our second landmark is the close kinship of Manuscripts 157, 517, and 1241. This trio we would place at the opposite end or side or bottom of the Beta-Text from that held by Manuscript 2427 and Vaticanus. We believe at present that this trio is related through an earlier intermarriage between the Beta-Text and the Alpha-Text. For these three witnesses, the Alpha-Text was the dominant strain and blotted out large numbers of Beta readings.

Between these two landmarks the rest of the Beta manuscripts live, move and have their being. And we do mean move! We have made detailed studies so far in only two chapters, and in them various manuscripts shift their positions. We very tentatively suggest that if one enters the Beta-Text from the 2427-Vaticanus side, he will come first upon Aleph (Sinaiticus), L, Delta, Psi, and the Coptic. Next he will find Manuscripts 892, 1342, and Ephrem Rescriptus; and at the far side Manuscripts 33 and 579 crowding toward the trio 157, 517, 1241. The partial nature of our knowledge at present forces us to handle these manuscripts as a coach handles a football squad and change this line-up every week as our study continues.

Beyond this major relationship of Manuscript 2427 to the well-known Beta-Text, there exists some kinship to other early witnesses. This is not extensive in quantity, but it suggests that part of our divergence from the Beta-Text may be due to the retention of primitive readings which the main line of the Beta-Text rejected.

But the most sensational readings of the Chicago Mark are

unique readings, readings without any support elsewhere. The extent of these is suggested by the following figure. Where we differed from Vaticanus, we looked up the reading of twenty-nine of the major sources; in 166 cases we found no support for the reading of the Archaic Mark in any of the twenty-nine.[6] The majority of these readings are short readings; that is to say, when compared with another text they appear as omissions. Many of them are the absence of personal pronouns; some are the absence of parenthetical material—explanations or glosses; a few are the absence of other elements which may be secondary.

One such "omission" is the omission of Mark 7:3-4. In the usual form of the text (*e.g.* in the American Standard Revised Version[7]), the seventh chapter opens as follows:

> "(1) And there are gathered together unto him the Pharisees, and certain of the scribes, who had come from Jerusalem, (2) And had seen that some of his disciples ate their bread with defiled, that is, unwashen, hands. (3) (For the Pharisees, and all the Jews, except they wash their hands diligently, eat not, holding the tradition of the elders; (4) And when they come from the marketplace, except they bathe themselves, they eat not; and many other things there are, which they have received to hold, washings of cups, and pots, and brasen vessels.) (5) And the Pharisees and the scribes ask him, Why walk not thy disciples according to the tradition of the elders, but eat their bread with defiled hands?"

That the parenthetical material in verses three and four is a gloss that originated outside Palestine has long been admitted; that it may have originated outside the Gospel of Mark is suggested by its absence from the Archaic Mark.

Again, in the King James Version, Mark 13:14 reads:

> "But when ye shall see the abomination of desolation, spoken of by Daniel the prophet, standing where it ought not, (let him that readeth understand,) then let them that be in Judea flee to the mountains."

[6] The twenty-nine witnesses are: Aleph, C, L, Delta, Psi, 33, 157, 517, 579, 892, 1241, 1342, Bohairic, Sahidic, Theta, Fam. 1, Fam. 13, Fam. Pi, 28, 565, 700, A, D, W, African, Itala, Old Syriac, Von Soden's Kappa, Textus Receptus.

[7] New York, Thomas Nelson and Sons publishers.

Many early witnesses, including the Beta-Text, omit the words "spoken of by Daniel the prophet." But the Chicago Mark also omits the parenthesis "(let him that readeth understand)," without any other support.

The climax, 2:27-28, of the story of the disciples eating the grain on the sabbath, is expressed in most forms of the text (*e.g.*, American Revised) as follows: "(27) And he said unto them, The sabbath was made for man, and not man for the sabbath: (28) So that the Son of man is lord even of the sabbath." On internal grounds, it is clear that the story has one conclusion too many. Some Delta-Text witnesses (Bezae and the Old Latins) omit the first ending, which occurs in verse 27. Manuscript 2427 omits the second ending (verse 28)—a much more improbable ending than the first.

Some of the shorter omissions are equally striking. In 3:11 instead of "Thou art the Son of God" the Chicago Mark reads "Thou art God." Other passages omitted are: 1:3, "Prepare the way of the Lord"; 5:1, "to the other side of the sea"; 8:34, "and let him take up his cross"; 14:14, "Say to the householder that the Teacher says, Where is . . ."; 14:72, "and Peter remembered the word." The most noteworthy of these is 8:34. As a result of this omission and its agreement with the Beta-Text in not reading the same phrase in 10:21, our manuscript has no reference to the cross on the lips of Jesus, the word appearing only in the record of the crucifixion, 15:21, 30, and 32.

The nature of these omissions and of the other non-Beta readings in Manuscript 2427 suggests that they are survivals of a form of the text earlier than the Beta-Text as it occurs in Codex Vaticanus. At present this can be stated no more positively than as a possibility; further study is needed for confirmation or rejection.

Thus, in spite of its late date and its insignificant appearance, the Archaic Mark is important as a witness to primitive manuscript usage and content. Its close kinship to the celebrated Codex Vaticanus promises to shed new light on the history and nature of the Beta-Text. This knowledge will be invaluable for the reconstruction of the original readings of the Greek text of the Gospel of Mark.

That the last shall be first is a Gospel rule, and it may turn out that the Chicago Mark contains the text of the Gospel of Mark in a more primitive form than any other known manuscript.

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A Note on the Frontispiece

In 1924 Emory College's portrait of its second president (1840-1848) was in a state of advanced decay, as shown by the reproduction in Professor John Donald Wade's biography of Longstreet. The recent repairs undertaken by Lewis Palmer Skidmore, Director of Art of the High Museum of Art in Atlanta, have nevertheless succeeded beyond hope in restoring the painting to its original brightness. It is revealed as a portrait of much greater artistic merit than had been supposed, while its documentary value has been considerably enhanced by the clarification of detail. The artist is unknown. His work followed the classical trend of painting in the Early Federal period, as indicated by the strong and expressive delineation of the subject's face, the manly pose, combined with the clumsy treatment of the hands, and the formal arrangement of draperies and landscape background. It is, however, only possible to classify the picture as an unusually fine specimen of what are now generally known as "American primitives." It is clear that the portrait shows A. B. Longstreet between the ages of forty-five and forty-eight, when he was still Judge Longstreet, the author of a successful volume of humorous sketches, *Georgia Scenes,* and before he had entered the Methodist ministry in 1838, to be followed by his election to the presidency of Emory College in 1839. The dating is assisted by noting the titles of the books in the lower left of the canvas, including the *Georgia Scenes* and treatises on the law. To this period of his life must have belonged the legal notebook preserved in the Library's Treasure Room, whose blank leaves he was shortly to employ for the composition of sermons. The portrait now hangs by the circulation desk of the University Library.

Patterns of Cerebral Function

By HARLOW W. ADES

Harlow W. Ades, B.S. (Illinois) '34, Ph.D. (Illinois) '38, is Assistant Professor of Anatomy in the School of Medicine. His studies have been directed to the analysis of the ability of the nervous system to compensate for injury to itself. In the following investigation the work on the neurology of loudness-discrimination was largely carried out by Dr. David Raab, Research Associate in Neuroanatomy.

THE HUMAN nervous system is composed essentially of larger and smaller masses of "gray matter" or, more properly, of nerve cells and the pathways through which the filaments of these cells interconnect adjacent or remote masses and through which connections are made to sense organs and muscles. Some of the masses, called nuclei, are small, relatively direct and uncomplicated in their connections, while others are large, have connections with many other nuclear centers, and are equipped, besides, for elaborate internal conduction in such a way that a single mass of gray matter may be functionally subdivided while retaining certain overall principles of activity peculiar to it. The outer layer of the cerebrum is a gray mass of this kind, and is called the cerebral cortex. It is possible to demonstrate subtle structural differences between its several geographical areas. The several areas thus defined differ from each other in the extent and nature of incoming and outgoing conduction pathways.

Until the early part of the 19th century, suggestions as to specific functional differences among the subdivisions of the brain were most meagre, and the concept of neural activity was necessarily vague. The earliest case report suggesting localization of a restricted function in a definite part of the brain was published in 1691 by Robert Boyle, who reported the facts but failed to perceive the implications. In an encounter, not otherwise described by Boyle, a knight was felled by a blow from a mace; when examined he had a palpable depressed fracture of the right side of the skull, and, upon recovering consciousness, was dismayed to find he could neither move nor experience sensation in either the left arm or leg. With a degree of luck uncommon at the time, a surgeon managed

to remove the fragments of bone which were pressing on the brain, and, within a few hours, the patient recovered normal sensory and motor function. It is not recorded that either he or the surgeon rejoiced and marvelled at the recovery, but if they did not, they should have, for it is certain that neither was in a position to understand either the malady or the cure. Any medical student of today who is not hopelessly misplaced in his profession could readily diagnose the case and direct the treatment with every hope of success; we now understand that the sensory and voluntary motor functions of one side of the body are dependent upon intact gray matter in the cortex of the opposite cerebral hemisphere, specifically in two adjacent parallel strips running laterally from the midline about at the vertex.

Early in the last century, attention was called to the possible implications of the more or less specific disorders of sensory or motor function attendant upon certain kinds of head injuries. Thinking along these lines was first stimulated, oddly enough, by a pair of Central European phrenologists, Gall and Spurzheim, whose ideas of the relation of brain configuration to personality and mental ability were based rather on fertile imagination than on accurate observation. These men were charlatans, even by the loose medical standards of a century-and-a-half ago, but they were not fools, and they managed to excite enough comment to stimulate closer study of neurological cases.

As time went on, more and more cases came to autopsy and closer and closer correlation of injury and effect became possible. It was soon evident that certain areas of the surface of the brain were concerned with the reception and appreciation of sensation, and that each mode of sensation (*e.g.* vision, touch, audition) was mediated in some way by its own private portion of the cerebral cortex. Likewise, just as injury to a "sensory area" resulted in a corresponding defect in ability to appreciate a certain mode of sensation, injury to still another region resulted in paralysis, or inability voluntarily to perform certain movements. The discovery of functionally specific cortical areas led immediately to animal experiments which showed that each area is so organized that it represents an orderly "map" of the body (in the case of tactile and

motor areas), a projection of the surface of the body on the surface of the brain, so that it is possible to speak of an arm or a leg area or a face area. In the case of the visual area, the organization is on the basis of a projection of the retina, the light-sensitive lining of the eye, and so on.

Up to this point the observation and reasoning were good enough, and can be supported today by better experimental methods and more enlightened observation. However, very early in the development of our ideas of localization of cerebral function there appeared in disconcerting numbers, reports of patients whose neurological damage was restricted enough, but whose resultant dysfunctions were neither purely motor nor purely sensory, but, instead, were defects of expressing or understanding language, or of memory or some other dysfunction involving more than isolated sensory or motor elements. The ultimate result of such observations was an epidemic of map-making among neurologists. On the basis of flimsy evidence or misinterpretation of symptoms, there were described in rapid succession brain-areas consecrated to the appreciation of music, the naming of objects, the *writing* of the names of objects, the appreciation of significance of pictures, and many others. The map-making proceeded merrily enough at first, but before long, all the surface of the brain had been subdivided into functionally specific spots upon which there was uncomfortably meagre agreement. Thus three different neurologists might find themselves ascribing widely differing functions to the same spot while attributing similar activities to widely separated regions. These circumstances could be multiplied by the number of neurologists and the square of the surface area of the brain.

The situation, in brief, became intolerably chaotic and remained so until the close of the first World War. By that time, four years of senseless flinging about of explosive-propelled steel fragments, paradoxically enough, had become a major factor in bringing order out of the confusion of the problem of cerebral localization. For many of the fragments had lodged in the skulls and brains of British soldiers. By an odd coincidence, most of these cases came under the observation of a single man capable of making the most of the wealth of neurological information thus made available.

This man, Sir Henry Head, through exhaustive studies of a vast variety and reduplication of cerebral injuries and their resultant neurological effects, pointed the way for a more reasonable view of cerebral localization than had hitherto been possible. The essence of his concept was that while certain basic sensory and motor functions are mediated by restricted and constant areas, the greater part of the cerebral gray matter is less specifically allocated, more labile in point of functional modification through learning, and that the more complex functions such as symbolic expression and appreciation, memory and thinking, are not independently localized unit functions, but are simply the combinations and permutations, with varying emphasis, of the basic sensory and motor functions.

Experimental studies of cerebral function in the last twenty years, with a few notable exceptions, have added little except detail to Head's theories, and have not departed from his thinking in any essential respect. Experimental extirpations of nearly every part of the primate brain have been carried out again and again, and the behavioral results have been sorted and catalogued repeatedly. Oddly enough, the most striking, and, from a medical viewpoint, the most significant and exciting aspect of these experiments has received scant attention, namely, the almost incredible ability of the brain to readjust and compensate in the absence of one area or another hitherto considered indispensable to the discharge of some special function.

Our studies of the last five years were begun on the thesis that the primary sensory and motor areas of the cerebral cortex are relatively inflexible in their connections, and are indispensable to the perception of sensory stimuli and the execution of selective movements. With this in mind, we undertook experiments aimed at analysis of the organization of the cerebral auditory area, not because the auditory system is of great clinical interest, but because it provided an easily accessible functional system upon which to experiment. It was already clear that the inner ear functions as a frequency analyzer in such a way that the neural activity induced by audible stimuli of varying frequency is directed over separate fiber groups of the auditory pathway as it ascends to its cerebral termination; this being true, interruption of parts of the pathway or its termination should result in permanent deafness or partial deafness

for sounds of certain frequency, but not for the rest of the scale. It was soon apparent that this was not the case; transient tonal islands did appear in the audiograms, but with continued testing, the curves soon returned to normal levels. Even after total removals of cerebral auditory areas, sensitivity soon came back to normal.

The auditory pathway within the brain is, like other ascending pathways, interrupted by nuclear masses at three levels before the cerebrum is reached. It now occurred to us that these small gray masses might be taking a greater part in the maintenance of normal thresholds of auditory sensitivity than we had supposed possible. When this hypothesis was explored, it was found that with no more than the most meagre intact auditory mechanism, far below the level of the cerebrum, the animals were still able to approach normal thresholds.

This in turn suggested that, at least for simple perception, the cerebrum is not necessary, although it may be used by the animal in making the association necessary for original learning of the conditioned responses by which its hearing is measured. The question of the normal function of the cerebrum as opposed to the normal function of subcerebral centers then became pressing. The answer might be sought by one of several methods. The way chosen was that of systematically varying the emphasis in testing attributes of hearing other than simple perception of presence or absence of sound, which was the essence of the previous tests.

We have just completed one step in this exploration by interrupting the auditory pathways at successively lower levels from the cerebrum down, having previously trained the animals to respond to small changes in loudness of two successive tones, and determining at each step the least difference in loudness that can be detected by the subject. We find in this instance, the animal has a midbrain center in addition to his cerebral auditory area, either of which is adequate to preserve his ability to discriminate small differences, but without *either,* the test tones must differ much more grossly before the change can be detected. In addition, if the cerebral auditory area is removed first, the discrimination habit is lost but can be quickly relearned, whereas if the midbrain pathway is severed first, the habit is maintained without relearning.

This takes us a long step forward, even though we have not yet found an auditory function which is impossible in the absence of the cerebrum. We can make the inference that, to put it as simply as possible, the intact animal uses the best neurological equipment at his disposal (cerebrum) in solving the auditory problem when first presented to him, but, if required, he can learn it using his "second-best" facilities. The next step is to follow the same general procedure using the just noticeable difference in frequency of stimulus as the test criterion, and, beyond that, further to complicate the auditory problem until we reach a level of integration that can be accomplished only by the ultimate elaboration of the cerebral gray matter, if this proves possible.

If the primary motor area of the cerebrum is removed or its descending connections severed, the result is an inhibition of voluntary movement of the muscles of the opposite side of the body (hemiplegia) of a variable degree and duration, depending on the species; the higher the animal in the phylogenetic scale, the more severe and enduring is the paralysis. This is essentially what happens in human cases of one-sided paralysis following a "stroke" or, more technically, a cerebral hemorrhage, destroying the motor area. Patients of this kind in whose gray matter the damage is extensive and permanent, usually fail to recover much of the lost function; sometimes the damage consists only in superficial pressure of blood which may be resorbed, relieving the pressure, and permitting return to normal function of the affected parts. In infra-human species, however, while the initial effects may be just as severe after similar damage to the motor area as in human cases of cerebral hemorrhage, recovery always takes place to a near-normal use of the hitherto paralytic members; the lower the species, the more rapid and complete is the functional recovery.

Ordinarily, in monkeys, severance of connection of the motor area of one hemisphere results in a severe contralateral hemiplegia (one-sided paralysis) from which return to grossly normal function takes place in about a month. We have found, however, if one motor area is removed, the animal allowed to recover for three months or longer, and then the other motor area destroyed, the second procedure produces no paralysis, although if the two opera-

tions are done simultaneously or very close together, each will have its usual separate effect. We have only begun the investigation of this phenomenon and the factors which may alter it, but at present it seems reasonable to infer that somehow, during the long period of recovery from the initial one-sided lesion, the pattern of neural readjustment necessary to permit function normally restricted to the motor area is transferred incidentally to the intact side, so that when it, too, is destroyed, there is a compensating mechanism ready to function.

To what extent and within what limits this property is shared by other cerebral areas remains to be seen. If it is a general characteristic of the cerebral cortex, aided by sub-cortical centers, the implications are of the greatest theoretical and practical significance. From the two types of experiment described, it seems apparent that we must give up the traditional ideas that (1) all conscious activities are dependent on intact areas in the cerebral cortex, and (2) that specificity of function is the most fundamental aspect of cerebral organization. It becomes necessary to look upon this mass of gray matter simply as the most elaborate integrative mechanism available, functioning predominantly in any type of conscious learning and perception because, due to its wealth of pathways for association, it is more labile and adaptive than any other part of the brain. It differs from other parts only quantitatively and not qualitatively, because the more simply constructed sub-cortical centers are capable of similar activities within their own quantitative limits.

The second concept we may formulate from the implications of these and similar experiments, is that of a cerebral cortex whose essential organization is one of *pattern* rather than *locus,* admitting that under standard conditions patterns may become localized in a standard sort of distribution. Furthermore, a pattern laid down (through simple observation, learning, or practice) in a particular cortical region may become, within limits, the general property of the entire cerebrum. There is no doubt that a pattern lost through destruction of its original cerebral matrix may be reestablished, and this, obviously, must take place in the remaining gray matter which was not originally involved.

Our plans for extension of this line of investigation embody two

principles: The first is systematic complication of learning and test situations for the experimental animals; the second is concentration of attention, not primarily on the defects resulting from cerebral injury, but on recovery of function and the factors influencing recovery.

The Pines of Emory

By CHARLES R. HART

Charles R. Hart, A. B. (Williams) '13, A.M. (Williams) '16, Ph.D. (Johns Hopkins) '27, is Professor of Romance Languages.

Dear grove of pine,
That I have loved so long,
May these late words of mine
Confirm the tribute of an earlier song.

How sweet to hear
A love of yesterday
Echo from year to year,
With music that shall never die away!

You are the thread
That binds the old and new,
The living and the dead,
Cherished remembrance and a forward view.

You are the frame
From which looks out on me
The picture that we name
With different names, life, nature, destiny.

You are the gate
Through which each day are sought
The humble things and great
Of which in varying measure life is wrought.

I do not ask
Another lot; I bless
The chance that set my task
Within the circle of your loveliness.

Accept, dear wood,
My song: may words of mine
Suffice to tell what Good
Was waiting for me in a grove of pine.

The Corporal

By MAJOR RICHARD T. BRICE

Richard T. Brice, B.S. in Engineering '31, M.S. '32, Ph.D. (California Institute of Technology) '37, is Instructor in Engineering on leave of absence in military service. During an extensive tour of duty in the South Pacific Theatre, Major Brice has closely observed both birds and soldiers. The sketch here printed is a literally truthful report of an American soldier encountered by chance in the Philippines. It should help us to realize the temper in which our youthful fighting countrymen are accepting the grim responsibility of war.

HAVE YOU EVER met a stranger who just appeared out of nowhere and talked a little while and then vanished as quietly as he had come, leaving you all choked up with wonder and admiration? That's the way it was the night in the Replacement Depot on Leyte when I stopped to pet the little monkey and remained to hear the Corporal tell his story. I don't even know now why I stayed, unless it was because there wasn't anything else to do and it seemed like the youngster needed someone to talk to. I had the idea that he was a rookie, just fresh over from the States, and I thought he was lonesome.

It was Cheeta, the mouse-colored monkey, that started us on our conversation. Her master had stopped to let us look at her and the Corporal was trying to get her to play with him, but she seemed none too anxious to leave the safety of her master's shoulder. Perhaps she did not care for the Corporal's dark-green fatigues, or maybe it was his sallow yellow skin, that made a sickly contrast with the heavy tan of all the other men. At any rate, she spurned the offer of his hand and came instead to snuggle in the crook of my left elbow, where she seemed content to comb the hairs on my arm with her long round fingernails, the while making soft little talking noises at me. Her master remarked that she seemed to like me, and I asked him where he got her. That brought on the usual explanation about the Filipino who had caught her up in the hills and traded her to a Sergeant who had given her to an MP who had sold her to her present master. The Corporal interposed that

he had seen some monkeys in New Guinea but they didn't look the same, and of course that started the inevitable discussion of the birds and animals each of us had seen.

Cheeta's master had come to the Philippines by way of Australia. I had a few months in the Solomons to my credit, and with the Corporal's occasional remarks about things he had noticed in New Guinea we could just about cover the Southwest Pacific with observations. The Corporal mentioned having seen a big bird with a huge bill as big as its head and with wings that went swish-swoosh when it flew, probably a hornbill, and then he said something about the white cockatoos with yellow crests that made an awful noise over his head when he was trying to be quiet in the jungle. Again, he made some remark about one of his friends finding a snake in his fox hole, but I still didn't get the idea that the Corporal was anything but a newcomer. Maybe it was because he seemed so naturally exuberant, like a kid just out of high school, and when he talked the words sort of tumbled all over each other as they came out.

Somewhere during the conversation Cheeta and her master got tired and wandered off into the night, and after that the conversation mostly became a monologue, to which I added just enough grunts and nods to keep it going. By then the Corporal had gotten off the subject of birds and animals and was talking about women:

"I wasn't married then," he went on, "and I didn't know much about mothers with babies. I was an only child, and you know what that means. We had an old doctor at home, I guess he's about ninety now, and he brought both Mother and me into the world. He always said he was disappointed in Mother because her mother had been one of thirteen and she herself had ten brothers and sisters and then when it came her turn she only had me. Anyway, this doctor used to come into the hospital where my wife worked, only we weren't married then, and if I was there talking to her, he'd always walk over and hand me one of his cards and say, 'When are you two going to get married?' He'd laugh and I'd laugh and my wife would blush."

The boy was talking steadily now, not waiting for any comment or reply. He had lost himself among his memories.

"Well, as I started to say, I didn't know much about babies then, only I did go to the hospital once to help a friend of mine bring his wife and baby home. Before she went to the hospital she was pale and washed-out looking, but when we brought her home her eyes were all sparkly and the baby was such a tiny little thing and the way she looked at it just made me all bubbly inside. I don't know whether you ever get bubbly or not, but I do. I'm a sympathetic guy, too, and I can weep with anybody that has troubles. Guess that's why I'm no good as a combat soldier. A guy just shouldn't have any feelings if he's gonna belong to a combat outfit."

Little by little I was getting the boy's background. Now I knew that he had been in a combat outfit and had trained awhile in New Guinea. Evidently he wasn't quite as much of a rookie as I had thought. He had probably been over a few months and somewhere along the line he must have gone soft and been transferred out. That would account for his being in the Replacement Depot. Maybe he was waiting for a new assignment where the strain wouldn't be so great. Too bad, I thought, because he's a nice kid, and there ought to be some place in this war where a youngster who gets "all bubbly inside" over the way a woman looks at a baby can do something that he won't have to be ashamed of, even if he isn't any good as a combat soldier. It was completely dark by now, and about all I could see of him was where the light from headquarters reflected from his face and left black shadows under his cheek bones. He paused for a moment while a truck went by, and then continued.

"I wasn't married then. I'd been going with my wife three years but I wouldn't get married 'cause I wasn't making enough money. Then, right at the last when I got ordered out, we went and got married. Funny about my getting into the Army, too. I had an occupational deferment at Lockheed, but I got to thinking about the other fellows I knew who were in the Army, and I thought if they could do it I could too. I went and talked to my Old Man about it and he said to go ahead if I wanted to, but he didn't

think it was a good thing because he said my nerves wouldn't stand it."

After hearing this last statement I was pretty sure that I had sized the boy up correctly. His father had been right, and something had gone wrong with his nerves. He just couldn't take it. However, I thought it would be interesting to hear how he would excuse himself in his own mind—they all do—so I continued to sit and listen.

"Well, that was how I got into the Army and I had a pretty good assignment too. I used to belong to the permanent cadre of this Replacement Depot, only it was in Australia then. I guess I didn't know when I was well off because one day I got to flag waving and thinking about the fellows who were going through the Depot on their way up forward. It just didn't seem like I was doing my share; so I got myself transferred to a combat outfit, and pretty soon after that we went to New Guinea. That was where they made me a corporal and gave me my squad. I had the best bunch of fellows anybody could want. Lots of times we'd be going through the jungle and I wouldn't hear a sound and I'd turn around and there they'd be, eight of 'em right behind me. That sure makes a fellow feel good. Of course, I was supposed to have ten, but we were short two.

"The whole squad worked together just like a team and we went through two campaigns without anybody getting hit. They were good-natured, too, and it seems like whenever we got in a fire fight everybody started to laugh, but I think maybe it was partly hysteria, 'cause it didn't ever seem so funny afterwards. I've talked with other fellows about this and I guess nearly all the men either laugh or cry. You have to do something to relieve the tension, and we all laughed.

"We had one kid who was kind of scary and at first he sort of hung back. Then one day I heard him pinging away on a little ridge right above me and crawled up to where he was lying under some brush. We could see down a hill to where a trail passed through a little cleared space. Every few seconds a Jap would come along the trail, and this kid was lying there chuckling to himself

and pingin' 'em off as they came. He never held back after that.

"Then there was the time we were all lying along the top of a ridge watching the edge of the jungle. All of a sudden eleven Japs jumped up and started toward us. The Sergeant was on one end of the line and I was on the other. Just as soon as the Japs started coming the Sergeant stood right up and started laughing. He grabbed a B.A.R. from his B.A.R. man and began to shoot, and I took the B.A.R. from my B.A.R. man and I went to shooting. When my clips were empty I went back a little ways and started to reload and by that time the Sergeant's clips were empty and he turned and threw them to me and said, 'Hey, load these too.' And he was laughing so much he could hardly talk. That's just the way it was. Always laughing when we got into a tight spot.

"After we finished our two campaigns on New Guinea they sent us up here, and this is where I got hit, right here on this island. We were going along a trail and came to a cleared place and my scout, who was out in front, stopped and wouldn't go across. He said he'd been there the day before and he knew what was on the other side of the clearing. I told him to give me his rifle and I'd go, but he said no, he wasn't going and he wouldn't let me go. We argued awhile and then we all went back to where the Captain was. He said we'd have to go across, and we all thought, well, if the Captain says we've got to, we'll go across. So we went back and the scout was the first one out in the open and I followed him. It wasn't as bad as we expected, and we didn't lose anybody getting across, but on the other side things really broke loose.

"That was the end of my squad. Two of my men got killed, and then it wasn't long till I got hit in the abdomen and they got my second in command at the same time. Before it was over they hit every one of us. In fact, they got the whole platoon including the lieutenants—not so many killed, you understand, but everybody wounded. My company dropped from a hundred and sixty—we were supposed to have more but we were short—down to sixty-four in three weeks. At that, I guess I was lucky. They sent me to a hospital in New Guinea by air and I got along pretty well. After I got well I started back on a ship, and right after we left I came

down with dengue and stayed in bed all the way. I was feeling better when I got here, but three days later I was sick again with a temperature of a hundred and four and they put me in a hospital here on the island. They made some tests and said I had malaria and hookworm. It took quite a while to get over those two, and now they've decided they'd better do something with me besides send me back to my outfit; so here I am, waiting for reclassification.

"That's about all there is to it. I feel fine now; better than I have since I first came over. I've been overseas twenty-seven months and I think they're going to rotate me back to the States. I'll sure be glad to get back but I wouldn't have missed it for anything. I don't believe I would ever have been able to face my Old Man if I hadn't gotten into combat. Still, I didn't have it any worse than he did, 'cause he had some pretty tough times in the last war. The thing that hurt worst was losing those two fellows who got killed. We'd been together a long time and it just broke me all up inside.

"Well, I guess I'd better be getting along now. It's sure a nice night. Thank you, Sir, for telling me about the birds."

He was gone before I could answer or even ask him his name. Maybe it's a good thing he left quickly, because there just isn't anything you can say to a boy like that. It's better just to keep still and listen.

Industrial Mineral Planning in Georgia

By Arthur C. Munyan

Arthur C. Munyan, B.S. (University of Kentucky) '30, M.S. (Cincinnati) '31, is Associate Professor of Geology. The material of this paper was gathered in the course of his investigations as geologic consultant for the Economic Planning Board of the State Engineering Experiment Station.

Widespread activities related to postwar planning are evidence that the people of Georgia are rousing from a lethargy which has gripped them for more than fourscore years. They feel, and rightly so, that today they have a unique opportunity to escape from the economic debility under which they have suffered for so long. They are determined, furthermore, to build a wealthier and more stable state by all available means and methods. They are, in other words, taking an inventory of all resources, human and natural, in order that this wealth may be used to the best advantage of the greatest number.

The role of Georgia's mineral industries in the total economic development of the state has been a minor one in the estimation of the average citizen, but this opinion undoubtedly results from a too great preoccupation with agriculture. On the other hand, there are a few who have realized the full importance and the enormous potentialities attendant upon the development of the state's mineral resources. These few are, in general, those who are actually engaged in the industry or are closely affiliated with it. It is they who, by their efforts, have contributed a proportionately larger share to the active wealth of Georgia than anyone else in almost any other line of endeavor. It is time, therefore, for the average person to revise his opinion of this industry.

The impact of the war, the desperate need of the nation for vastly increased mineral production, and the advancing knowledge of the intrinsic possibilities in mineral resources for providing new industries in the state justify a greater interest in these materials.

Postwar planners are quite aware that they may no longer evaluate the resources of a region in terms of one or two obvious factors, such as agriculture and available land, but must consider carefully *all* resources from the viewpoint of their integration into the total pattern. When this truth is recognized, an examination of the state's economic structure will show that the mineral resources occupy a position of major importance in it. No longer may they be relegated to the shadowy background so conveniently provided by the agriculturists. In fact, one of the most startling revelations has been that the mineral resources are almost as important as agriculture to the welfare of the state.

Investigations made during the past two years have proved the validity of this statement time and again. The writer, representing the Department of Geology at Emory University, together with members of the State Engineering Experiment Station at Georgia School of Technology, has made a rather detailed economic geologic study of the state and of adjoining areas. This investigation has demonstrated conclusively that mineral production is far more valuable on the basis of numbers of workers employed than is agriculture. A more extended discussion to illustrate this point may be of interest. The sources of the following statistics are the *1940 Census of the United States* and *The Minerals Yearbook* of the U. S. Bureau of Mines (1941).

There were, at the time of the census, 3,123,723 persons in Georgia. Of this number, 375,542 persons were engaged in agricultural pursuits, or were directly dependent upon farm products for their support. The total value of the farm products, at the time, was $165,956,195. This means, then, that the average income per person engaged in farm work was about $442 for that year.

The Minerals Yearbook for the same year reports the value of the state's mineral production as $14,633,655. The Census states that the number of workers engaged in this industry was 3,950. The average value of minerals produced by each worker must have been, therefore, approximately $3,700, or 8.37 times as much as for an agricultural worker. It is obvious, however, that this figure does not represent an employee's personal income for that period,

but does mean that that amount was received by the mineral industries for each employee. Actually, the workers in mineral industries received an average hourly wage of $0.31 for eight hours work over an average period of 280 days.

The inevitable conclusion must be, consequently, that the mineral resources of the state offer, up to a point, a far greater monetary return per individual worker than does agriculture. Although the total income from such sources does not now approach that from agriculture, every effort should be made to increase the magnitude of the mineral industries because of the enormous potentialities which they possess. However, if Georgia is to receive the maximum benefits from them, the mineral resources must be given a great deal of attention. This attention must go far beyond the casual interest of past years, for it must evaluate as exactly as possible all factors which influence mineral production.

One factor stands prominently above all others in importance to future development: the accurate determination of reserves. This, clearly, is a huge job as well as a difficult one, but one which must be done carefully, accurately, impartially, and at once. Georgia now stands at the threshold of tremendous industrial expansion, which we may enter upon in either of two ways: one, without adequate knowledge of our strength, groping our way blindly; or two, proceeding with the best possible information concerning our resources, following a carefully thought-out plan of development. If the latter course is chosen, then we shall no longer be forced to surmise and speculate about our mineral resources.

The available knowledge of such resources in Georgia is only partly satisfactory. As the accompanying figure shows, it is possible to estimate only approximately the total quantities of recoverable reserves for each specific mineral. There has been an attempt to secure more exact information concerning the reserves of sedimentary kaolin and bauxite, but even this has been hampered by insufficient field work. Still less information is on hand regarding such important minerals as iron ore, manganese, and barite, which are so important to the Cartersville area. Stone, of course, from all practicable viewpoints, is present in the state in unlimited

amounts. However, this statement does not apply to all kinds and varieties of dimension stone, for some of them are quite limited in quantity.

The accurate evaluation of the mineral reserves of the state must accompany or immediately follow upon studies directed toward a determination of the qualitative distribution of these substances. Considerable knowledge of the distribution and occurrence of various mineral deposits in the state has resulted from geological activities in Georgia over the past forty or fifty years. But, up to now, there has been no concerted effort to correlate the information so obtained in a form suited to a precise interpretation of future trends. It is all very well to know that a given mineral occurs in a certain locality, but, without knowledge of its quantity, it is impossible to appraise the degree of its applicability to modern industrial development.

Present-day industry also demands complete information as to the quality of the raw materials which it uses. Here again the planner experiences difficulty in trying to arrive at a definite conclusion about a particular mineral resource, because he usually finds that a solitary chemical analysis represents a single deposit, no matter how large its areal extent or thickness. Obviously the ordinary mineral deposit formed by multiple geological processes will vary considerably within itself; no one chemical analysis or physical analysis may indicate the useful value of the deposit. Therefore, greater mineral development awaits, in part, this type of evaluation.

The planning work of the writer and of the State Engineering Experiment Station has demonstrated the great need, in Georgia, for this type of information. Some of it has been obtained, in small degree, by field observation, but the greater portion has, of necessity, been based upon the judgment and experience of those actually engaged in producing specific minerals. The accompanying figure, as a result of the paucity of information, is, at best, a rough approximation of the available reserves. It is quite certain that the postulated relative abundance of each mineral will change materially

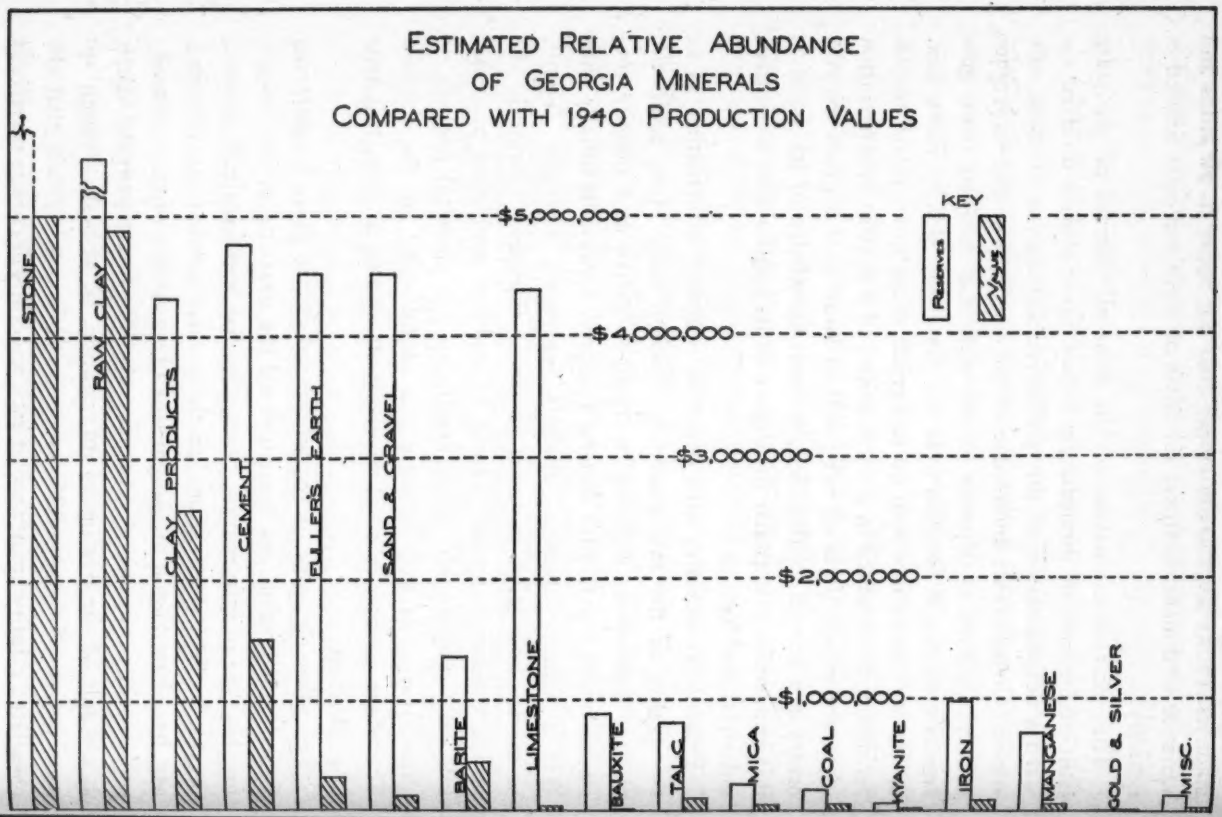
ESTIMATED RELATIVE ABUNDANCE
OF GEORGIA MINERALS
COMPARED WITH 1940 PRODUCTION VALUES
KEY
VALUE
RESERVES
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
STONE
RAW CLAY
CLAY PRODUCTS
CEMENT
FULLER'S EARTH
SAND & GRAVEL
BARITE
LIMESTONE
BAUXITE
TALC
MICA
COAL
KYANITE
IRON
MANGANESE
GOLD & SILVER
MISC.

in the light of information gained from additional investigation. At present, however, it probably is the best estimate possible.

Since planning may be interpreted to mean, in one sense, the focusing of attention on certain problems and patterns of development, the figure will serve to illustrate a phase of mineral planning in Georgia which must be given most careful consideration. It shows, on the left, the more important non-metallic mineral resources, while grouped on the right are the fuels and metallics. The asymmetry of the arrangement is at once apparent, for the non-metals far overbalance the metals and fuels both in quantities available and in value of production in 1940. The meaning of this is quite clear: the state's major reserves of known minerals are predominantly of the non-metallic type. This shows in turn that development emphasis should, primarily, be placed upon these minerals, for they fit best into the pattern of a long-range development program. Of course, it is by no means advocated that the fuels and metallics be excluded from such plans, nor that the search for new minerals and new sources for known minerals be abandoned, but only that each substance be given its deserved position in such calculations.

If it is admitted that the non-metallic mineral resources of Georgia afford the greatest opportunities for expansion in the minerals industry, then, perhaps, an examination of some of their characteristics and industrial uses will give a clue to their future development. It is impossible, in the space provided, to discuss them all; it may be best, therefore, to outline the possibilities of one or two. Limestone and clay have been selected for this purpose.

Limestone rock is composed principally of the compound calcium carbonate with an admixture of varying proportions of clay, silica, magnesium carbonate, organic matter, numerous iron-bearing minerals in small amounts, and other rarer minerals in still smaller quantities. Theoretically, absolutely pure limestone might consist of 100 percent of calcium carbonate, but actually few limestones exceed a content of 95 percent. Limestone composed of 93 to 99 percent calcium carbonate is called "high-calcium" lime. Other designations of type are derived from the kind of "impurity" con-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$3,000,000
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RAW CLAY
CLAY PRODUCTS
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FULLER'S EARTH
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tained in the rock. For example, one with a 10 percent magnesium carbonate content is known as magnesium limestone or a "dolomitic" limestone. If the magnesium carbonate content approaches or equals 45 percent, however, the rock is known as a "dolomite." A "siliceous" limestone is one in which the sand content is abnormally high; a "bituminous" limestone is one with more than the ordinary amount of organic material; an "argillaceous" limestone is one with a high clay content.

Many other types of designation are also used: coquina, encrinal, crystalline, marly, oolitic, cherty, etc. All terms of this kind, however, have but one object in view, namely, to give as briefly as possible a description of the principal constituents, so that the rock may be classified quickly and easily in its proper category. One of their primary functions is to describe the industrial possibilities of the rock. For example, a "hydraulic" limestone has a certain proportion of clay, so that when the rock is calcined and mortar is made from the sinter, the mortar will "set" under water.

The constituent of limestone which is generally of the greatest interest to the producer, however, is the calcium oxide or "lime" content of the rock. The term "lime" is often applied as well to a mixture of calcium and magnesium oxides, because for many purposes they act alike. Lime is extensively used in a great array of products manufactured for the building industry, agriculture, and the chemical industry. Literally hundreds of manufacturing and chemical processes require it as an essential raw material. But other properties of the rock are also of industrial interest. The crushing strength and absorptive qualities are important in the manufacture of crushed stone for road building and concrete-aggregate use. In the manufacture of rock wool the non-pulverulent quality as well as the chemical composition is important in the behavior of the raw stone in the kilns.

It should be obvious, therefore, that all qualities of the rock are of the greatest importance in determining the ultimate use of the rock. A solitary chemical analysis is not, even by the greatest stretch of the imagination, sufficient to solve the complex problems of the potential manufacturer contemplating the use of such min-

erals. Is this, perhaps, partly the reason for the deficient limestone development in Georgia? The answer must be yes, for there has been relatively little investigation of the limestone resources of the state with these facts in mind.

Next rises the question concerning the availability of limestone in Georgia. Is there a sufficient quantity of limestone to meet these demands? How is it distributed geographically? There are few possible specific replies because of the lack of correlated knowledge already mentioned, but it is likely that there is more than enough limestone for many purposes. Mapping investigations over the state have shown that there are large reserves in northwest Georgia and the Coastal Plain, but that the Piedmont has limited amounts, chiefly in the form of marble. A few localities have been thoroughly investigated, but most of the limestones still await critical study before they can be developed extensively. From all limestone deposits now being mined, Georgia derives finished products valued at less than two million dollars, even including the value of limestone used in cement manufacture. Aside from that used in cement, the total value of limestone used for other purposes is about $100,000. It seems, therefore, that Georgia has tremendous potential wealth in this one mineral resource, but it must wait upon much more extensive investigation for its complete realization. Accurate planning and future development depend upon fundamental information; without it little can be done.

The clay industry in the state, second only to stone in value, presents a picture considerably improved over that of limestone, but still far from being completely satisfactory. Probably this industry owes its larger degree of development to a much longer period of mining activity. The early English colonists in this region were undoubtedly well acquainted with the "china clays" of England. As a result, upon seeing similar deposits in this country, they were able to visualize the use of such material in familiar ways. Also it is likely that the simple techniques in mining such deposits had much to do with the early development and long history of clay operations in Georgia.

The clays of the state are of many types, such as: kaolin, pottery

clay, brick clay, fuller's earth, and bentonite. The latter two types are not included on the figure with the general clay category, but are placed in a special class because of their distinctive character. Clay is, in general, composed of an alumino-silicate with varying percentages of alkaline earths, each one of which seems to give specific characteristics to the material. In addition, there are many other elements and materials included in raw clay, just as there are in limestone, which impart still other more special qualities to it. There may be clays with a high iron content, called "ferruginous" clays; much organic material, in certain forms, may form a "lignitic" clay. Sometimes the ultimate use of the clay gives a name to the raw materials: "fire" clay, "paper" clay, "pottery" clay, "rubber" clay, etc.

The largest portion of Georgia's sedimentary kaolin production is used in two major industries: refractories and paper. The latter employs the clay both as filler for pulp paper, and as a coating for the fine "slick" papers used in the more expensive magazines and books. The refractories industry uses a certain proportion of kaolin in the clay mix from which ordinary fire brick, furnace and flue linings, porcelain enamel and insulation, mullite bodies, etc., are manufactured. However, considerable quantities of special types of kaolin are also used as filler by the rubber industry and by the linoleum producers. There has, in addition, been some use of the clay in pharmaceuticals.

The possibility of widening the field of application of the kaolins is the subject of extensive current research. Studies by the State Engineering Experiment Station have shown that there is a definite place in the economy of Georgia for the production of whiteware of many types. The regional market, it is reported, will support three to five chinaware plants of the hotel china type; about three sanitary ware plants; five to ten enameled ironware plants; and two to five plants for the production of electrical porcelain ware. Considerable study is being made of the use of kaolin in the manufacture of metallic aluminum and alumino-salts, for kaolin contains almost as much aluminum oxide as does the mineral bauxite which is the ore of aluminum. The postwar possibilities for wider use of

light metals such as aluminum make this a particularly attractive field of investigation.

But present geological knowledge of the Georgia sedimentary kaolins is too limited to serve adequately the industries mentioned. For instance, very little accurate information exists concerning the volume of kaolin deposits, their specific composition, or the manner of their origin. Even so, perhaps more is known of the kaolins and their possibilities than of almost any other mineral resource in the state.

Clays other than the kaolins have a bright future provided they receive their proper share of attention. Brick clays in particular deserve considerable investigation for two reasons. First, the brick industry of Georgia is well established and a distinct asset to the state. It should, therefore, be encouraged to grow and thereby remain a source of major income for the state. Secondly, the brick-clay industry faces a period of sharp competition in postwar days from newly developed building materials. Its growth, perhaps survival, will depend greatly upon whether brick can compete profitably and esthetically with these new materials. Therefore, new uses and applications must be discovered and technical and engineering information developed.

Similarly much additional research in the field and in the laboratory is required on the bleaching clays—fuller's earth and bentonite. Georgia is the leading state in the production of fuller's earth; the annual value of the product is between three hundred and four hundred thousand dollars. Obviously this is an industry which cannot be permitted to decline.

The question of planning for the remaining mineral resources of Georgia is complex, but it is not an insoluble problem. First of all, as shown above, the determination of quantities must be undertaken. This should be followed or accompanied by a most thorough investigation of the quality of each mineral, so determined that a request for a specific mineral to do a specific job may be answered by reference to a definite location. The citizens of the state must demand exact and accurate information about their mineral re-

sources; and this information can be supplied only by competent, technically trained specialists.

It seems likely that the future trend of mineral resources development in Georgia will move more and more in the direction of the non-metals. The state possesses, apparently, far greater reserves of this group of minerals than it does of metallic minerals. Therefore, the wisest course for industrial development to follow is one which takes this fact into consideration. The encouragement and support of research in refractory and insulating materials, glass production, brick and tile manufacture, new chemical compounds, whiteware, agricultural fertilizers, paint, rubber and paper fillers and coaters, road materials, concrete-aggregate, cement, stone (polished and rough), and other similar products should be a major objective of statewide concern. Furthermore, since fuel is required for all such proposed development, the search for petroleum should be unremitting. The establishment of new sources of hydroelectric power should likewise be kept in step with the other lines of research, for Georgia is extremely deficient in mineral fuels at present.

Georgia, without question, does have a large variety of minerals, many of which are very valuable. But, with one or two exceptions, she does not produce them in amounts anywhere near her total capacity. Even at this reduced level, the value of the annual mineral production in the state is very large, but present figures would seem small indeed beside those which would result from near-capacity production. Let us, therefore, examine and reexamine more intelligently our mineral resources, so that we may award them their deserved position of distinction in our planning programs.

Lord Byron: British Champion of American Democracy

By WARD PAFFORD

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NOT LEAST among the attractions that the poetry of Lord Byron (1788-1824) held for older generations of Americans was its bold expression of the ideal of political freedom as exemplified by the United States during the early decades of this nation's independence. The great romantic has, however, given way in recent times to others much less confident than he of America's role of leadership in the unending war against the enemies of liberal idealism and democratic institutions. It is the purpose of this essay to call attention to the sound conclusion, as yet only partially established,[1] that Byron was a much more ardent admirer of America than is generally known, and to define in general terms the quality of his enthusiasm.

Those who might feel a certain squeamishness about the value of this British aristocrat's opinions concerning America may be reminded that Byron amounted to a great deal more than the college graduate's hazy recollection of a romantic hero with a club foot and the countenance of a god, remarkable chiefly for a predatory eye for women and a shocking code of morals. Byron was a great poet by any kind of yard-stick (not the only one whose popularity with the literate of our time has suffered comparative eclipse); he was a man of action who could outshoot, outswim, and outbox most of the athletic boneheads of this day or that; he was a politician whose parliamentary career, while brief, marked him as a statesman of insight, idealism, high principle, and rare courage; he

[1] An excellent preliminary study of the subject has been presented by Joseph Jay Jones in "Lord Byron on America," *University of Texas Publication No.* 4126, *Studies in English,* 1941, pp. 121-137. Though his paper offers the results of an examination of some important sources, further investigation reveals evidence for a much firmer assertion concerning Byron's championship of America than might be justified by Jones's disclosures alone. Except where specific notation is made to the contrary, all quoted evidence in the present study is unaccounted for in the Jones article.

was, last of all, one of the most sincere and dedicated worshippers of political and social liberty in the history of modern democracy. He hated cant, hypocrisy, materialism, and tyranny over the soul and body of man. He cried out all his days against these, and in the end he died willingly in defending an oppressed people against them.

Extensive examination of Lord Byron's own writings and of much of the literature dealing with his life and career shows that Byron admired no nation as he did the United States, that he idolized no man as he did George Washington, that he regarded no part of the world as so worthy of bearing the hope of the future as that called "New." On the basis of evidence discoverable, it is apparent that one of the great advocates of free thought and action has suffered ill usage at the hands of his debtors of a later day.

Poetry, some have argued, can be discounted as an authoritative medium by which a man's true opinions are conveyed: the heightened imagination may force into distortion the writer's constant and basic evaluation of ideas, men, and institutions. The validity of this objection will depend upon the habits of expression peculiar to the writer in question, and upon the recurrence throughout his work of a persistent viewpoint toward a given subject.

Byron's mature verse concerned with his own milieu is generally in the nature of satire which, even when cloaked under an idle and playful mockery of its subjects, aims in dead earnest at abuses historically patent. The bulk of the poetic references to America are found in verse of this sort, nearly always in a context of indignation against European personalities, attitudes, and forms that can be precisely documented. Furthermore, this poetry reveals an opinion of America which is remarkably constant, though Byron's attitude steadies itself and appears most prominently in the last decade of his short life. These generalizations, amply validated by letters, journals, and reports of conversations, lead to one conclusion: Byron meant what he wrote about the United States.

A significant example of Byron's estimate of America is a famous passage from his "Ode on Venice," composed in 1818:

CARNEGIE LIBRARY OF ATLANTA

> One great clime,
> Whose vigorous offspring by dividing ocean
> Are kept apart and nursed in the devotion
> Of Freedom, which their fathers fought for, and
> Bequeath'd, a heritage of heart and hand,
> And proud distinction from each other land,
> Whose sons must bow them at a monarch's motion,
> As if his senseless sceptre were a wand
> Full of the magic of exploded science,—
> Still one great clime, in full and free defiance,
> Yet rears her crest, unconquer'd and sublime,
> Above the far Atlantic!—She has taught
> Her Esau-brethren that the haughty flag,
> The floating fence of Albion's feebler crag,
> May strike to those whose red right hands have bought
> Rights cheaply earn'd with blood.—Still, still, for ever
> Better, though each man's life-blood were a river,
> That it should flow and overflow, than creep
> Through thousand lazy channels in our veins,
> Damm'd like the dull canal with locks and chains,
> And moving, as a sick man in his sleep,
> Three paces and then faltering:—better be
> Where the extinguish'd Spartans still are free
> In their proud charnel of Thermopylæ,
> Than stagnate in our marsh,—or o'er the deep
> Fly, and one current to the ocean add,
> One spirit to the souls our fathers had,
> One freeman more, America, to thee!

The general context of this quotation is a lament for the decline of the state of Venice from a great and benevolent power to a wretched pawn of Austrian kings. America appears in terms of contrast as the accomplished ideal from which all the heavy-laden of the earth may draw inspiration to match her deed or nobly perish striving.

"The Age of Bronze," composed in the winter of 1822-23, a few months before Byron was to sail from Italy to death and glory in Greece, refers also to America as the antithesis of enslaved Europe.[2] In this poem Byron views the contemporary European scene, and as he gazes upon it, his glance discovers nothing but evil; it is to America that he turns for relief from the unbroken expanse of chaos, desolation, and tyranny. Washington, whom Byron praises above all men, is an idealized figure of heroic stature

[2] This poem is cited in Jones, *op. cit.*, but throws much more light on Byron's judgment of America than that article suggests.

who stands as the foil to another, though fallen, hero of Byron's—Napoleon, the tragic might-have-been, who by reason of vanity and lust for power became Europe's most immoderate tyrant. The Congress of Verona, where Europe's senile masters conferred in 1822, is bitterly satirized in the same poem, and the attack is edged by highly complimentary references to the Congress of the United States and to leaders such as Bolivar, Patrick Henry, and Franklin, as well as Washington.

Washington is the most frequently mentioned of American personalities who appear in Byron's poetry. Sometimes he is mentioned only in a single line, but always as an idealized, perfect hero of noblest proportions. He is never the butt of a Byron joke (and Byron in his satiric vein was no perfect respecter even of his own heroes), and only once is he mentioned in anything approaching a frivolous context—in "The Vision of Judgment," when Satan cites Washington and Franklin as witnesses against George the Third. Elsewhere Washington is invariably the "tyrant-tamer" ("The Age of Bronze"), "whose every battlefield is holy ground" (*Don Juan,* VIII, 5), or who received little thanks for his deeds except "the all-cloudless glory (which few men's is)/To free his country" (*Don Juan,* IX, 8). The most florid tribute paid Washington is the concluding stanza to the "Ode to Napoleon Buonaparte," written in 1814, when Byron's favorite autocrat suddenly abdicated and betrayed, as the poet saw it, a cause which he should have supported to the death. Three years later, in 1817, the epic Washington eulogized in the "Ode" becomes, in one of the magnificent concluding stanzas of *Childe Harold* (IV, 96), the child of nature personifying liberal leadership in an ideal society which is seen in sharp contrast to the enslaved Italy of the early nineteenth century:

> Can tyrants but by tyrants conquer'd be,
> And Freedom find no champion and no child
> Such as Columbia saw arise when she
> Sprung forth a Pallas, arm'd and undefiled?
> Or must such minds be nourish'd in the wild,
> Deep in the unpruned forest, 'midst the roar
> Of cataracts, where nursing Nature smiled
> On infant Washington? Has Earth no more
> Such seers within her breast, or Europe no such shore?

This same Rousseauistic fancifulness is more obvious in Byron's idealized portrait of Daniel Boone, the mighty hunter, the happiest of men living in perfect guilelessness amidst the idyllic surroundings of the American frontier. In seven continuous stanzas of *Don Juan* (VIII, 61-67), Byron's crowning work, in light and colloquial verse the poet writes of the imagined simplicity and pure good in the primitive society of an ideal state of nature. The following stanzas illustrate the whimsical romanticism in which Byron could indulge himself for relief from too much contemplation of the stricken civilization of a decayed Europe:

> Crime came not near him—she is not the child
> Of solitude; Health shrank not from him—for
> Her home is in the rarely trodden wild,
> Where if men seek her not, and death be more
> Their choice than life, forgive them, as beguiled
> By habit to what their own hearts abhor—
> In cities caged. The present case in point I
> Cite is, that Boon lived hunting up to ninety;
>
> And what's still stranger, left behind a name
> For which men vainly decimate the throng,
> Not only famous, but of that *good* fame,
> Without which glory's but a tavern song—
> Simple, serene, the antipodes of shame,
> Which hate nor envy e'er could tinge with wrong;
> An active hermit, even in age the child
> Of Nature, or the man of Ross run wild.

In "The Island," composed in the year before his death, Byron brings together once more in a short passage (II, 4) the two constant themes that run through his interest in the New World—enthusiasm for a primitive natural society on the one hand, and on the other a dramatization of the contrast between the established freedom across the Atlantic and the miserable bondage of a Europe enslaved by tyranny:

> Thus rose a song, the harmony of times
> Before the winds blew Europe o'er these climes.
> True, they had vices (such are Nature's growth)
> But only the barbarian's—we have both:
> The sordor of civilisation, mix'd
> With all the savage which man's fall hath fix'd.

Who hath not seen Dissimulation's reign,
The prayers of Abel link'd to deeds of Cain?
Who such would see may from his lattice view
The Old World more degraded than the New,—
Now *new* no more, save where Columbia rears
Twin giants, born by Freedom to her spheres,
Where Chimborazo, over air, earth, wave,
Glares with his Titan eye, and sees no slave.

There are other references to America scattered through the corpus of Byron's verses, some relatively trivial, some perhaps as suggestive as those mentioned above. Taken all together, they are sufficient to show plainly that Byron recognized and was profoundly stirred by liberty's flourishing growth in the New World, though his chief concern was with its eventual triumph in the Old.

The account of his interest in America left in Byron's letters and journals and in the reports of others who knew him forms a sturdy buttress to the conclusion to be drawn from the argument so far. Byron once remarked in a letter to John Murray, his publisher, that "I never was consistent in any thing but my politics,"[3] and the testimony of both his utterances and his deeds bears out the truth of this declaration.

In November, 1813, Byron wrote in his journal:

> But men never advance beyond a certain point; and here we are, retrograding, to the dull, stupid old system,—balance of Europe—poising straws upon kings' noses, instead of wringing them off! Give me a republic, or a despotism of one, rather than the mixed government of one, two, or three. A republic! —look in the history of the Earth—Rome, Greece, Venice, France, Holland, America, our short (*eheu!*) Commonwealth, and compare it with what they did under masters. . . . To be the first man—not the Dictator—not the Sylla, but the Washington or the Aristides—the leader in talent or truth—is next to the Divinity! Franklin, Penn and next to these, either Brutus or Cassius—even Mirabeau—or St. Just.[4]

Eight years later he recurred to the theme: "There is nothing left for Mankind but a Republic, and I think that there are hopes

[3] *Letters and Journals*, ed. Prothero (London, 1901), II, 312.
[4] *Ibid.*, II, 339-40.

of such. The two Americas (South and North) have it: Spain and Portugal approach it; all thirst for it. Oh Washington!"[5]

In 1822 he said: "An American has a better right than any other to suggest to other nations the mode of obtaining that liberty which is the glory of his own!"[6]

And in 1824, in the last weeks of his life when all his thought and time were being spent with plans for overthrowing Turkish rule in Greece, Byron concluded, according to Captain Parry:

> In the United States of America there is more practical freedom, and a form of government both abstractedly better and more suited to the situation of the Greeks than any other model I know of. From what I have already said of the different interests and divisions which prevail in Greece, it is to me plain that no other government will suit so well as a federation. I will not say a federation of republics; but a federation of states; each of these states having that particular form of government most suitable to the present situation and wishes of its people.[7]

An interesting and remarkable fact about Byron's estimate of the American republic, if the reporting of Parry is to be trusted, is his prophetic thought concerning slavery as an institution in this country:

> I would not answer, indeed, for the continuance of the present system of government in America, should that country be involved in long and expensive wars. In any season of distress, the free and slave states will separate. Freedom and slavery cannot dwell under the same roof; to bind them together force is necessary, and nothing but an arbitrary master over both can keep them united.[8]

This must be one of the earliest prophecies of the tragedy that almost shattered the republic forty years later.

[5] *Ibid.*, V, 462.

[6] Thomas Medwin, *Conversations of Lord Byron* (London, 1824), p. 324. Citing letter to Mr. Church. Quoted in Jones, *op. cit.*

[7] William Parry, *The Last Days of Lord Byron* (London, 1824), p. 174. The first sentence of the passage is quoted in Jones, *op. cit.*

[8] *Ibid.*, p. 214.

There is, in the reports of a number of American citizens who had personal contact with Byron, a considerable amount of evidence bearing witness uniformly that Byron's cordial interest in his visitors and their land is not to be explained simply by good manners and a flattered appreciation of his mounting popularity with American readers. Among his American guests who left such accounts were George Ticknor, George Bancroft, Edward Everett, and W. E. West. There were others not so famous, among them Dr. J. H. Hayward, a young American physician just graduated from Harvard College. The recently published letter that Byron wrote in response to Hayward's request for an interview was composed a month or so before Byron left for Greece in 1823:

> If you can do me the honour to call at one or two o'clock *tomorrow* I shall be very glad to see you.—It is a pleasure to receive the Citizen of a free country any where—but especially in these wretched countries—as the sight of such a rarity encourages a hope that time may do for the old world—what the better hearts and hands of the Americans have so nobly done for the new.—I have never been one of the wretched and too numerous crowd of jealous corruptionists amongst the English who are doing their worst to stifle the natural sympathy between the descendants of the same fathers.—I should not only be mean but ungrateful were it otherwise—for to America only can I look for any thing like justice in the appreciation of my real sentiments on the rights of mankind.—[9]

That Byron's interest in the United States was not altogether ideological is shown by the respect in which he held Washington Irving and the delight that he took in Irving's works. Byron read everything of Irving's that came his way and plagued the publisher John Murray to send him more. He was sensitive to the American author's opinion of his work (as he was to that of Americans generally), and he would have been happy to know that it was Irving who took it upon himself to arrange for the American publication of the eagerly-awaited life of Byron which had been prepared by the Irish poet Tom Moore.

[9] *Byron on America, An Unpublished Letter to Dr. Joshua Henshaw Hayward, 29 March* 1823. *Houghton Library Brochure Number Two* (Cambridge, Mass., 1942).

The characteristic mood in which Byron's few exhibitions of impatience with America and Americans occur is one of flighty petulance. There were Americans in his day, as there have been since, who abused Byron and his work. His reaction in such instances was angry—and shortlived. Parry's testimony to the effect that Byron cared nothing for democracy and that he regarded the American war of independence as unfortunate for the Americans is in such direct contradiction to the entire record of Byron's written words and to statements attributed to him by a number of other friends and acquaintances that its authority may be seriously questioned.

Lord Byron admired the young United States to the extent that she became for him the almost perfect symbol of democracy as a fact accomplished to serve as the ideal modern pattern by which men should build for the future. He adored Washington to the point of idolatry, admired other patriots of the Revolution, praised Irving without stint, delighted in the legendary Daniel Boone as every American boy has since, and greeted with warm courtesy all who crossed the Atlantic to be flattered by his eager questions. Nowhere may one find more eloquent and free-hearted tribute to an America that could yet justify a great foreign poet's steadfast confidence in her destiny.

Everybody Talks About Research

By OSBORNE R. QUAYLE

Osborne R. Quayle, A.B. (Swarthmore) '19, M.A. (Harvard) '21, Ph.D. (Johns Hopkins) '24, is Professor of Chemistry. Since his appointment to the Emory University faculty in 1924 he has been especially concerned with the building of research facilities at Emory and their extension throughout Southern education and industry.

MARK TWAIN'S famous statement that everybody talks about the weather but nobody does anything about it, mingles wit with a delighted awareness of human frailty. But while it is still not possible to order tomorrow's weather, much has been done to modify our weather's effect upon us. Great indeed has been the contribution to all of us of those hardy individualists who have had the vision and courage to be dissatisfied with weather as we find it. The modification of weather goes back to the first shelter and the first controlled fire and continues to the present day. The electrically heated and air-conditioned worker's home in the Tennessee Valley creates for most of his hours a far more pleasant "weather" than did the great plantation's manor house of only yesterday, which was hot and humid in summer, cold and drafty in winter. But even so, Mark Twain's saying appeals to us because it is too nearly true. Far too often we talk a great deal and do far too little.

Many times and in many places the lack of research in the South has been discussed. The subject has become almost as worn as the weather, and there would be no reason to go over it once more except that, like the weather, something can be done about it. Perhaps this has not always been so, but today there is ample proof that the opportunity is here, if we but have the vision and courage to join in doing our part with those who have already made the beginning. Research in the South is of greater importance to our future than many of us realize, and depends more upon us than upon any other factor. Let us then, even once more, talk about research, about research in the nation, and more particularly, about research in the South and research at Emory.

The libraries and laboratories of a nation are visible signs, almost signboards, proclaiming its position upon the rungs of the ladder of advancement.

The libraries are the repositories of the knowledge and culture of the past. But they are much more than mere storehouses. They make possible not only the study of the past but also the more effective and intelligent planning for the future. This is equally true no matter what the field of investigation, whether it should be the philosophy of taxation, or the synthesis of a drug. For some fields the library is almost both library and laboratory. It would hardly seem necessary to mention the essential place of the library, it has been so well recognized, except that in the general acceptance of it the distinction between a library and a good or great library is frequently forgotten or overlooked. The great universities of the nation not only have good or great libraries, but the possession of a fine library is one of the marks by which a great university may be recognized. If the universities of the South are to take their proper place among the great universities of the country, their libraries must be strengthened accordingly.

The laboratories of the nation are the proving grounds of our technical progress. They are the control towers of the present and the nurturing ground for the training which makes men the masters of machines. But they are much more than routine establishments of testing and training. They are the white-hot assay furnaces of the speculations of men's minds. And before those who have the vision to see, the laboratory holds the mirror upon whose surface may be seen the fleeting shadows of tomorrow. Shadows, at first mere suggestions, but which can become paths leading us to higher levels, each height scaled giving us greater vision and showing still higher peaks in the future.

Such is the promise of the great laboratory. Such a laboratory may be the laboratory of a great university in New England, the Grecian temple of an industrial institute in western Pennsylvania, or it may be the architecturally more prosaic but scientifically as dramatic research laboratory of a corporation in Michigan. It could be a laboratory in a university in Georgia. There are many ways of measuring the greatness of a laboratory and of the research

which is its reason for being. Certainly the yearly expenditure of the laboratory is not in itself a complete measure. However, if we may assume in general that great resources are most frequently available to those who have already proven their value, the measure of expenditure may be somewhat indicative, even if it is not a complete appraisal. This is particularly true of the industrial laboratories of the nation. Ever-increasing expenditures for research would only be possible for those corporations in which that research expenditure produced results of economic value. The three hundred million dollars being spent annually in industrial research is proof in itself of its economic soundness and value.

The academic laboratories are by and large the source of the fundamental research upon which the work of the industrial laboratories is based. They are of course, in addition, the primary training ground for all research workers. There are fourteen academic institutions whose yearly research expenditures each reach the figure of one million dollars, the American magic figure.[1] These institutions stretch across the country in a contiguous group of states from Massachusetts to Minnesota and then skip to California. The great industrial laboratories are principally in this same region. The next fourteen academic institutions in research expenditure are by and large in the same section of the country, although in this group appears Duke, the first institution of the Southeast upon this list.

Great libraries and laboratories in a university, even great expenditures, do not necessarily insure research of the highest calibre. Men are also needed; great men are even more precious than the finest equipment or the records of past accomplishments. Such libraries and laboratories do, however, provide the facilities through which such research can be accomplished by such men. They provide the facilities through which the most efficient and economic use can be made of the intellectual resources that are available. Intellectual resources will flow toward those institutions having

[1] Research Expenditures of American Universities (annual, pre-war):

Over $2,000,000	$1,500,000 to $2,000,000	$1,000,000 to $1,500,000
California	Cornell	Mass. Inst. Tech.
Chicago	Minnesota	New York Univ.
Columbia	Wisconsin	Ohio State Univ.
Harvard	Yale	Univ. of Penna.
Illinois		
Michigan		

such facilities, and to a considerable extent will be drained away from those which do not.

Research, or original contribution to man's knowledge, is one of the functions and obligations of a university. A university must pass on the accumulated knowledge of the past, but it must also discover and synthesize new knowledge that man's horizon may expand. If new knowledge is not acquired and only the old is passed on, there would be no progress even in perfection. A university is hardly worthy of the name if it does not in some measure contribute to man's accumulated wisdom, and is not great if it is not great in this function.

Research is the cornerstone of the foundation upon which is based the technological and industrial development of a nation. Scientific research has a dual contribution to culture. First, it affords a field for the highest development of reason and a breadth of liberal thinking which can be subjected to the most critical examination. And second, in its practical application it contributes to, if it is not primarily responsible for, the economic uplift of all society, providing thus indirectly the resources of time and opportunity for the development of all fields.

The development of the South has been handicapped by the lack of great libraries, great laboratories, and consequently of great universities. No proof is needed that such institutions could have been staffed, as men of the South have staffed such institutions elsewhere. No proof of the calibre of students from the South is necessary, as too many of these students have succeeded elsewhere. Much has been heard of the problems of the South. It has been called the number one economic problem of the country and the number one economic opportunity of the country. Both statements are generalizations that are too broad, and yet there are elements of truth in each. Much has been said recently concerning freight differentials and the reverse subsidy they have fastened upon this section. Irregularities and injustices in the freight structure should be corrected. However great this destructive force of freight differentials has been, it pales into relative insignificance compared with the effect of the research differential that exists.

This handicap is very real and should be of tremendous concern

to those who wish the South to take its rightful place. This differential is not imposed by the rest of the nation. No court decisions need to be won, no laws repealed. What is needed is the recognition of the existence of this handicap, the appreciation of what its removal would mean, and the realization that we are in a position to remove it if we will.

Research holds out hope to the South. Not hope of what may be accomplished by a modern Aladdin's lamp or philosophers' stone, but hope, almost certainty, in a sound development based upon the hardest work. On the other hand, research holds a threat to those who do not realize the changes it will bring. A threat that the shrewdest plans for the future based only upon the knowledge of the past are almost certain to result in disappointment if not in utter failure. The negative lesson of the failure to look forward is strikingly pointed out in a recent article by the chancellor of Syracuse University.[2]

"In the research laboratory of General Motors there hung for many years a photograph of a gigantic industrial plant, the Barney and Smith Car Company. On the brass plaque below it was this story:

> Above is a picture of the greatest enterprise in America in its day. It produced most of the wooden passenger cars then used by the railways of America. Its profits were great. Its stock sold above par. Its officers were leaders of business. One day a man walked in with plans for a steel car. The directors considered them politely and handed them back. They were not interested in a steel car. They were building wooden cars which they said could not be improved. The man took his blue-prints to another concern which adopted them. Five years later this great plant was a collection of empty buildings. The corporation was in bankruptcy and the stockholders did not receive a dollar for their once valuable stock."

While the lesson in regard to research is obvious, one additional point should be stressed. This firm could have done the necessary research. Desire was lacking because appreciation of its need was lacking. The general appreciation of our needs has been perhaps our greatest need.

[2] W. P. Tolley, "Education for Tomorrow," *Bulletin of the Association of American Colleges*, XXX (May 1944), 211-12.

On the other hand a realization of the tremendous strides that are being made in fundamental and applied research may be at first somewhat discouraging. How will it be possible for us to keep up or catch up with the head start that has already been made elsewhere? Will we not be in the position of poor Alice, who had to run faster and faster, and even when pulled along at full speed by the Red Queen, could barely manage to keep up with her surroundings? In a relative manner this may be partially true. We should indeed be fortunate if, at full speed, we could at any early date match the contributions of other sections with research institutions, academic and industrial, that have been long established. Fortunately we should not need to be running entirely against the speed of others. Our contributions rather would represent a net gain to the effectiveness of the whole. Fortunately also, in the land of research, what has been established becomes readily available to all. We can reach the active frontiers of new discovery rapidly. Our forces are not as far to the rear as one might fear from the superficial evidence. The evidence, if more carefully examined, reveals considerable strength already beginning to come forward. These signs appear in both the industrial and academic fields.

Most fortunately, these signs are too many to be given in detail; one or two examples will suffice. The textile industry has never been research-minded in the past; yet during the past year two research institutes were established in this industry. One of these, the Institute of Textile Technology, was established in Virginia with its major support from the Southern textile industry. In addition several individual textile mills have initiated or greatly expanded their research organizations.

The Southern Research Institute has been established in Birmingham modeled after the Mellon Institute. Its beginning has been modest but it has been sound. A distinguished chemist, Dr. Wilbur A. Lazier, with a record of very real accomplishment, has accepted the directorship of this institute. The men behind it and its progress to date promise well for the future.

Southern industrial establishments both large and small are endeavoring to expand their research facilities. The economic value of industrial research to even the moderate-sized organization is

being recognized, and capital for such developments is more available than in the past.

The research spirit, research funds, and research accomplishments are more widespread throughout our Southern educational institutions than ever before. Advances worthy of notice are being made in several universities, and yet the stressing of any single illustration might detract from the picture of the improvement noticeable throughout the whole section. The number of research publications from the South has definitely increased in recent years. The national honor society for the promotion of scientific research, Sigma Xi, installed four chapters in the past year; three were in the South.[3] Research funds have been augmented in both state and privately controlled universities.[4]

Because of our peculiar interest in Emory University the situation here should be commented upon at least briefly. The greatest single factor in the improved research outlook at Emory University is the firm conviction held by President White that a university is only accomplishing its full purpose, can only be of the fullest service, and can in fact only become a real university, when it includes productive scholarship as one of its primary functions. Research productivity is so greatly affected by environment that the contribution of leadership provided by the President looms as the first factor, even beyond the magnificent gifts of the General Education Board and others to the graduate development of the University. The Medical School has long been our one center of productive research. Additional equipment, funds for assistants and other purposes, as well as supplementary personnel are to be found here. The continued progress of this well-established unit of the University is apparent. A more striking change in kind is beginning to occur in the Graduate School. The University Center Research Fund has been established, and grants have been made to our faculty and to those in other units of the University Center. Funds have been included in the annual budget of the University for grants in aid to our faculty. These funds have this year been increased. The

[3] Emory University, Vanderbilt University, North Carolina State College.

[4] A particularly notable increase in funds available for research has been obtained at the University of Alabama.

considerable Frances Coleman McCandless Research Fund for grants in the field of biology and medicine has been established. Grants have been received from foundations and industrial sources outside of the University. Additional funds have been provided for equipment in the various departmental budgets. Greater research purchases can be made for the library. The scholarly series of *Sources & Reprints* from the University Library has been begun. THE EMORY UNIVERSITY QUARTERLY is making its first appearance. It is expected that a larger number of graduate fellowships will be available after the war. The teaching schedule of faculty and graduate assistants is being arranged to foster research by providing periods of unbroken time. The changes in each individual situation may not have been great. Additional resources and much further progress are needed; yet the sum total of these and other similar advances is impressive.

The war is of course retarding this development. It is retarding fundamental research work and the training of research men everywhere. There is developing an acute shortage of scientific personnel in this country which is alarming. In view of the anticipated post-war needs of the country, it approaches the magnitude of a national catastrophe.[5] The development at Emory University of a program for the training of the highest type of research personnel would be a national service as well as a service to ourselves and the South.

The time has come not only to talk about research but to train research scientists, and through our own research to contribute to the sum of human knowledge. The economic demand for the trained research worker will be great. These best brains of Southern youth can be retained in the South instead of being exported elsewhere to add to the culture and wealth of other sections. The University has largely passed through the necessary preparative stages. The challenge is here; the opportunity lies before us.

[5] This is strikingly and convincingly shown in an article by M. H. Trytton in the January 1945 *Scientific Monthly*, "The Impending Scarcity of Scientific Personnel."

PUBLICATIONS

of the Emory University Faculty—1943 & 1944

PART I

In this number of THE EMORY UNIVERSITY QUARTERLY are listed the publications of the Faculty of Arts and Sciences for 1943 and 1944. Publications of the professional schools will be listed in the October issue.

C. E. CLARK (Associate Professor of Mathematics)
"On the Join of Two Complexes." *Bulletin of the American Mathematical Society*, XLIX, 2 (February 1943), 126-29.
"The Betti Groups of the Product of Two Normal Spaces." *Ibid.*, XLIX, 4 (April 1943), 307-13.
"The Betti Groups of Symmetric and Cyclic Products." *Ibid.*, XLIX, 6 (June 1943), 450-54.
"The Symmetric Join of a Complex." *Ibid.*, L, 2 (February 1944), 81-88.

R. A. DAY, JR. (Assistant Professor of Chemistry)
"A Study of Organic Parachors. VII. A Series of Saturated Hydrocarbons." With O. R. Quayle and G. M. Brown. *Journal of the American Chemical Society*, LXVI, 6 (June 1944), 938-41.

REID BINGHAM DUNCAN (Assistant Professor of History)
Letters of General J. E. B. Stuart to His Wife, 1861. Emory Sources & Reprints, Series I (1943), No. 1. 30 pp.

THOMAS H. ENGLISH (Professor of English)
Review of Don Cameron Allen, *The Star-Crossed Renaissance. South Atlantic Bulletin*, VIII, 4 (February 1943), 1, 7.
"The Library Situation." *Ibid.*, VIII, 4 (February 1943), 3.
"Emory's Joel Chandler Harris Collection." *Ibid.*, IX, 1 (April 1943), 3-5.
"Scholarly Newspaper." *Ibid.*, IX, 1 (April 1943), 8.
Review of Theodore Spencer, *Shakespeare and the Nature of Man. Religion in Life*, XII, 3 (Summer 1943), 453-54.
"The Treasure Room of Emory University." *Southwest Review*, XXIX, 1 (Autumn 1943), 30-36.
Review of Alexander B. Salley, *Catalogue of the Salley Collection of the Works of Wm. Gilmore Simms. South Atlantic Bulletin*, IX, 2 (October 1943), 1, 4.
Review of Raymond B. Nixon, *Henry W. Grady: Spokesman of the New South. Emory Alumnus*, XIX, 9 (November 1943), 6.
The Autobiography of Joseph Addison Turner, 1826-1868. Emory Sources & Reprints, Series I (1943), No. 3. 20 pp.
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"American Civilization." *Ibid.*, X, 3 (December 1944), 2.

P. W. FATTIG (Curator of the Museum)
The Mutillidae or Velvet Ants of Georgia. Emory University Museum Bulletin, 1 (July 1943). 24 pp.
The Phyllophaga or May Beetles of Georgia. Emory University Museum Bulletin, 2 (February 1944). 32 pp.

ALBERT GRIFFIN (Associate Professor of Business Administration)
"Inflation." *The Emory Wheel*, XXIII, 15-19 (February 25-April 15, 1943).
"State Reports—Georgia." *The Southern Economic Journal*, X, 1 (July 1943), 85; X, 4 (April 1944), 333-35; XI, 2 (October 1944), 209-10.

JOHN A. GRIFFIN (Assistant Professor of Journalism)
A Progress Report of Georgia Tech's Part in the War. Submitted to the Board of Regents, University System of Georgia, October 20, 1944. 32 pp.

LAURENCE D. HASKEW (Professor of Education)

Building a Better South Through Education. With Edgar L. Morphet. *Southern States Work Conference Bulletin,* 3 (1943). Tallahassee, Fla.: The Southern States Work Conference on School Administrative Problems.

Using Recordings in Teaching. With Elizabeth Donovan. Atlanta, Ga.: State Department of Education, 1943.

Recordings at Work. Atlanta, Ga.: State Department of Education, 1944.

"Relation of the School Board to Planning." *The School Executive,* LXIII, 9 (May 1944), 52-53.

"Planning a Better Education for the Southern Region." *Alabama School Journal,* LXI, 2 (October 1944), 9-11.

"The Age of Pioneers." *North Carolina Education,* XI, 2 (October 1944), 70 ff.

R. T. LAGEMANN (Assistant Professor of Physics)

"Velocity of Sound and Molecular Association in Liquids." *The Journal of Chemical Physics,* XII, 11 (November 1944), 464-65.

"The Nomograph as a Teaching Aid." *American Journal of Physics,* XII, 6 (December 1944), 340-41.

CHARLES T. LESTER (Associate Professor of Chemistry)

"The Addition of 4-Mercaptobiphenyl to a Series of 1-Olefins." With George F. Rodgers and E. Emmet Reid. *Journal of the American Chemical Society,* LXVI, 11 (1944), 1674-75.

THOMAS E. MCDONOUGH (Professor of Physical Education)

"Physical Fitness: Wartime Program of the High School Victory Corps." *Georgia Education Journal,* XXXVI, 7 (February 1943), 20.

ROSS H. MCLEAN (Professor of History)

Review of Robert J. Kerner, *The Urge to the Sea: The Course of Russian History. Journal of Modern History,* XV, 1 (March 1943), 85-86.

Review of Richard G. Massock, *Italy from Within. The Journal of Politics,* V, 3 (August 1943), 325-27.

D. R. MCMILLAN, JR. (Professor of Physics)

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H. PRENTICE MILLER (Associate Professor of English)

"The Authorship of *The Slaveholder Abroad.*" *Journal of Southern History,* X, 1 (February 1944), 93-95.

"J. M. Steadman Bibliography." *South Atlantic Bulletin,* X, 2 (October 1944), 3-4.

ARTHUR C. MUNYAN (Associate Professor of Geology)

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"Subsurface Stratigraphy and Lithology of Tuscaloosa Formation in Southeastern Gulf Coastal Plain." *Bulletin of the American Association of Petroleum Geologists,* XXVII, 5 (May 1943), 596-607.

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Review of Harvey Wish, *George Fitzhugh: Propagandist of the Old South. Ibid.,* XXI, 2 (June 1944), 157-58.

Review of Thomas Ewing Dabney, *One Hundred Great Years: The Story of The Times-Picayune from Its Founding to 1940. Journal of Southern History,* X, 3 (August 1944), 365-66; *Journalism Quarterly,* XXI, 3 (September 1944), 265-66.

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Review of Ernest Wallace, *Charles DeMorse: Pioneer Editor and Statesman. The United States: 1865-1900,* II (September 1942-December 1943), 317-18.

OSBORNE R. QUAYLE (Professor of Chemistry)

"Densities, Surface Tensions, and Parachor Values of a Series of Hydrocarbons." Serial No. 20. American Petroleum Institute Hydrocarbon Research Project, The Ohio State University Research Foundation, May 1943. 2 pp.

Review of Rudolph Macy, *Organic Chemistry Simplified. Journal of Chemical Education,* XX, 10 (October 1943), 517-18.

Review of William T. Caldwell, *Organic Chemistry. Ibid.,* XXI, 2 (February 1944), 103-4.

"A Study of Organic Parachors. VI. A Supplementary Series of Tertiary Alcohols." With K. O. Smart. *Journal of the American Chemical Society,* LXVI, 6 (June 1944), 935-38.

"A Study of Organic Parachors. VII. A Series of Saturated Hydrocarbons." With R. A. Day and George M. Brown. *Ibid.,* LXVI, 6 (June 1944), 938-41.

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W. B. REDMOND (Associate Professor of Biology)

"Variations in the asexual cycle of *Plasmodium* when transferred to an abnormal host." With R. M. Prather, Jr. *Journal of the National Malaria Society,* II, 1 1943), 25-29.

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L. V. ROBINSON (Associate Professor of Mathematics and Astronomy)

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JOSEPH C. SEIBERT (Associate Professor of Business Administration)

Monthly Reviews of Business Activity in the City of Atlanta, published once each month in the business section of the Sunday *Atlanta Journal* since December 1943.

EDWARD J. SHEA (Assistant Professor of Physical Education)

"Realistic War Training." *The Journal of Health and Physical Education,* XIV, 4 (April 1943), 200.

"Understanding and Overcoming Men's Fear of Water." *Beach and Pool,* XVII, 10 (October 1943), 9 ff.

"Methods of Relieving Cramps in Swimming." *Athletic Journal,* XXIV, 2 (October 1943), 45-46.

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GARLAND G. SMITH (Professor of English)

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W. A. STROZIER (Professor of Romance Languages)

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WILLIAM B. STUBBS (Professor of Political Science)
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JOHN E. TILFORD, JR. (Assistant Professor of English)
"Contemporary Criticism of *Lavengro:* A Re-examination." *Studies in Philology*, XLI, 3 (July 1944), 442-56.

GOODRICH C. WHITE (President of the University)
"The Selective Service Status of Ministerial Candidates." *Christian Education Magazine*, XXXIII, 5 (September-October 1943), 16-17.

JAMES HARVEY YOUNG (Assistant Professor of History)
"Anna Elizabeth Dickinson and the Civil War: For and Against Lincoln." *Mississippi Valley Historical Review*, XXXI, 1 (June 1944), 59-80.
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EDITORIAL

Our fellow-countrymen have two conflicting opinions of the scholar. He is held in a peculiar esteem, the rewards of which are virtually automatic and at least socially tangible. And he is held in an equally peculiar suspicion, the penalties of which may appear to be inevitably incapacitating.

Perhaps nowhere has it been easier to win a popular reputation for scholarship than in our country. Whoever teaches may have it, with all the outward forms of respect, for the taking. The popular acceptance of the teacher as a scholar, *ipso facto,* is one aspect of the American idealization of education. The motive is pure even if the manifestation is sometimes embarrassing. Almost every college teacher will recall his prompt elevation to the doctorate on taking over a freshman section.

A special regard for the scholar has obtained from the beginning of our frontier civilization. In urban communities even the superficial appearance of learning commanded respect; in the backwoods it inspired awe. Hence the leading influence once possessed by the professions of the ministry and the law was based primarily on the assumption of the erudition of their members, and secondarily on their opportunities for its forensic exhibition.

But at the same time that Americans were displaying an almost superstitious veneration of the man of learning or his counterfeit, the typically British appreciation of the practical man of affairs was undergoing a veritable apotheosis in the new country. Individualism, however rugged, if joined with initiative and crowned with success, won rewards of reputation, trust, and influence seldom granted in any other place or time.

It would be difficult to explain why it has been so, but the American people have at the same time idealized the characters of the scholar and of the practical man and have played one off against the other. This has resulted in a curious and typically American phenomenon. It is universally agreed that schooling, as much schooling, and so presumably as great an acquisition of knowledge, as possible, is the almost indispensable preparation for all careers. Yet there is a widespread popular prejudice that the

individual who has made knowledge his profession by that act has made knowledge in himself inefficient and untrustworthy.

Now it would not be difficult to find numerous examples of men who after becoming fully conditioned to academic routines, have sought to enter business or professional fields in which they lacked experience, and became casualties of the competition they encountered. There is always the anomaly of the possessor of theoretical knowledge who somehow fails to make a success of its practical application. It may be admitted that since scholarship is a career in itself, a change to one even closely allied with it is attended with some peril.

But do observed facts justify the strange suspicion with which the scholar is regarded who proffers intellectual participation in "practical" matters? Since formal schooling plays so large a part in the preparation of Americans for their life-work, it may be questioned why a young man should be required to sit under the tutelage of scholars through his formative years if they can be of no service to him for the rest of his life. Most men looking back on their college years are ready enough to admit that they nowhere near exhausted the stores of knowledge freely offered to them.

In certain fields, indeed, the scholar now enjoys an overall confidence never his in the past. Most scientists are allowed to possess a wide usefulness, although the usefulness of a mathematician like Einstein must perhaps be taken on faith. It is the philosophers, historians, students of literature, and above all scholars in politics, sociology, and economics who awaken feelings of sharp distrust. The virulence of the attacks of some practical men of affairs upon scholars in these latter fields almost passes belief. It would seem that they were trying to enforce the creed which John Addington Symonds ascribed to the mediaeval church: "Ignorance is acceptable to God as a proof of faith and submission."

It would be unwise to attempt a blanket vindication of all who profess scholarship or are accounted scholars. In this ill-assorted fraternity there abound sciolists, quacks, and the self-deluded, besides the multitudes who lacking all credentials to membership yet enjoy a sort of clandestine fellowship. In college and university

faculties not all are masters and doctors who possess those degrees. Among the lay ministers of the present-day religion of science there are many

> Blind mouths, that scarce themselves know how to hold
> A sheep-hook.

The scholar who knows that he knows, the teacher who feels his vocation at his heart's core—these will not be content to practice their profession of learning as though "to know" and "to do" were verbs of different conjugations. The true scholar will not be willing to have his meditated thoughts dismissed as mere rhetorical or logical exercises. But it may be just as well that each one be required to make his own way, proving the faith and the competence that is in him by overcoming whatever obstacles lie in the path to public acceptation.

The scholar who rests content in the mere forms of regard which are paid to his profession and person, who is willing to be maintained as a minor functionary of state whose office is little more than ritualistic, has abandoned his moral integrity. The alternative is not retreat to the ivory tower. The arts and sciences belong to life; they are the very treasures of life. He who has gifts of knowledge to give must seek to acquire power and persuasion to make his gifts accepted. This may seem a hard condition, but it certainly illustrates one phase of the text, "It is more blessed to give than to receive." Blessings are made in a resistant medium. If the knowledge of the scholar is to be availing to the enrichment of life, its transmission, as its acquisition, must be the result of unshirked effort. And so paradoxical is the national character that the scholar who finds and proclaims the principle of life in his studies may find himself accepted as an equal by lords of finance, captains of industry, and chiefs of state.

T. H. E.

A Faith for These Times

A Review by HENRY M. BULLOCK

Henry M. Bullock, B.Ph. '24, B.D. '25, Ph.D. (Yale) '32, is Professor of Religion at Millsaps College. For Emory's Centennial celebration in 1936 he wrote A HISTORY OF EMORY UNIVERSITY.

This little book consists of lectures on religion to a group of ministers and laymen at the Crystal Springs Assembly Grounds in Michigan, by one of the professors of the Candler School of Theology.[1] Although the book is "not a monograph in theology," as one reads he moves with a competent guide among many of the cross-currents of theological thought in our times. Not technically theological, the book is vigorously doctrinal from first to last. It conveys an unmistakable sense that the writer lives in this present world and works amid its confusions and perplexities with a firm grasp upon the direction and substance of his faith.

From the opening chapters on "Good News for Society," and "The Individual and His Faith," the book is an arraignment of the superficial liberalism and the worship of science which have been so roundly denounced in recent years. Continuing his forthright presentation of a God-centered faith, his chapter on "Discovery versus Revelation" is a spirited assertion that "the Christian religion is based on revelation, on Divine self-disclosure."

Those who are impatient with the present moratorium on Christian apologetics will find themselves reading with zest Chapter IV on "God and Grace." Those who have been perplexed by the strange silence of many Christian leaders in providing what the average man calls "proof" of the existence of God, will be helped and heartened by it.

In Chapter V, on "Man and Sin," Dr. Cannon carries the battle deeper into enemy territory in his discussion of modern materialism. He brings cogent criticism against modern science's estimate of man, as an interpretation which ignores pertinent data, and views man out of his context. He says, "Greek philosophy admonished man to know himself, but that admonition came only after the philosopher had studied nature and had delved into the causes of the world of which man was a part. The creature of a day sees himself only in the mirror of eternity, and man finds his true meaning in the purposes of his heavenly Father." Indicative of his thinking in this area is the following passage concerning the economic interpretation of human life and history:

> It singles out one of the aspects of what man does, and then tries to tell us that that single act is man himself. Martin Luther was reared the son of a peasant, and the characteristics of his boyhood remained with

[1] *A Faith for These Times.* By William Ragsdale Cannon. Athens, University of Georgia Press, 1944. xi, 93 pp. $1.25.

him until the day he died. And yet something more than the desire for food and shelter led him to repudiate the teachings of the Roman Church. If man is an economic animal, he is at the same time much more. Not only is he influenced by his environment and subject to the forces which surround him, but he also changes the environment. The industrial revolution, for example, is not so much a chapter in economics as a chapter in the history of human genius. Human thought made possible a new order of economic life.

The style of the book is rich in scriptural language, without being trite. The content sets one's mind off in many directions, making the reader wish the author had gone further out this or that road. The reviewer found his interest mounting as he read the later chapters.

Perhaps it is too much to expect within the brief compass of six lectures, but one cannot help wishing that the author had developed more fully his interpretation of the meaning of the sacrificial life and death of Christ, after rejecting some classical interpretations. But then, what this great fact needs is not so much interpretation for our minds, as experience in our hearts!

What a stimulating book this would be if its chapters became the agenda for discussions among college professors or ministers intent upon escaping their several occupational diseases of the mind! What a wholesome if surprising *piece de resistance* the book would be if assigned to be read by college seniors, obsessed with their major fields to the point of viewing knowledge and life through the knotholes of their own specializations! Constantly throughout its pages the uncritical ideas of the man in the street as well as the more respectable dogmas of the campus, are held up against the backdrop of a world view. And this without elaborate mechanics! Done in a style that laymen can enjoy, these lectures illustrate sharply what the old universities meant when they held that theology is queen of the sciences.

The Old Plantation

A Review by LLOYD W. CHAPIN

Lloyd W. Chapin, A.B. '23, M.A. (Harvard) '30, formerly of the Department of English is now Registrar of the Georgia School of Technology.

In Putnam County, Georgia, in March 1862, a planter, politican, and man of letters named Joseph Addison Turner published the first number of a little weekly newspaper called *The Countryman,* thus adding a print-shop to his other interests, which included a law practice, a hat factory, a tannery, a distillery, a seat in the Georgia Senate, and a plantation. An advertisement in the first number of *The Countryman* brought in a sandy-haired youngster, not yet fourteen, to learn the printer's trade. The boy lived on Turner's plantation for nearly five years, reading in a well-stocked library, learning the craft of

printer and journalist, and listening endlessly to the songs and stories of the Negroes. It was an association of no small significance to Southern letters, for the boy was Joel Chandler Harris.

Thus *The Old Plantation: A Poem,* by Joseph Addison Turner, published in *The Countryman* in eight installments in the fall of 1862, and now attractively reprinted as the third in the second series of *Sources & Reprints*[1] becomes an item of historical interest. In all candor this is not great or even good poetry. Heavily and frankly indebted to Goldsmith and Gray, the poet writes of a "wanderer" mourning over the desolated scenes of his childhood; the verse is dignified but wooden, the diction "poetic," the mood more often lugubrious than elegiac. But beneath this heavy increment of literary artificialty is an authentic, though idealized, Middle Georgia plantation scene. Here are partridge and possum, buttermilk and ashcake, dogwood and sweet-shrub, Yankee schoolmaster and camp meeting preacher, blacksmith and miller, country store-keeper and county politician—homely and real in the midst of eighteenth-century literary elegance.

For a poem completed in 1859, the treatment of the Negro (and of the abolitionist) is admirably restrained. "Let us alone—we know the negro best" writes the poet, insisting that the Negro needs a master if he is to survive. The attitude is typical of many of Turner's contemporaries. Indeed, for all his eccentricities, Joseph Addison Turner was a symbol of his class—and this poem eloquently testifies to a Middle Georgia planter's taste in poetry and politics, and to his deep affection for a way of life which did not survive Sherman's march to the sea.

Professor Miller has admirably edited this number, which again fulfills the promise made in the first number of *Sources & Reprints* that "it may be anticipated that as a whole, the *Emory Sources & Reprints* will be a contribution to Southern cultural history."

[1] Joseph Addison Turner, *The Old Plantation: A Poem. By the Wanderer.* Edited by Henry Prentice Miller. *Emory Sources & Reprints,* Series II (1944), Number 3. $0.50.

Monograph on Banking

A Review by JOSEPH C. SEIBERT

Joseph C. Seibert, B.S. (Miami University) '32, M.B.A. (Northwestern) '33, Ph.D. (Northwestern) '41, is Associate Professor of Business Administration.

Albert Griffin, Associate Professor in the School of Business Administration and Chairman of the Department of Economics, has recently completed a monograph on the vocational opportunities in the field of banking.[1] The monograph outlines the nature and traces the historical development of the banking profession, and includes a detailed analysis of the departments and services of the present-day banking institution. From a background of personal experience, Mr. Griffin has been able to portray clearly the opportunities available to those who wish to select banking as a career.

Directed primarily to the high school and college student, the monograph suggests preparations which should be made and capacities which should be

acquired. A course of study is outlined for those college students who wish to elect banking as a career and who desire to shape their college training toward this end. A breadth in education is stressed as an essential requirement of all who aspire to responsible positions of bank management. A quotation popular in bank circles suggests that, "A successful banker is composed of about one-fifth accountant, two-fifths lawyer, three-fifths political economist, and four-fifths gentleman and scholar—total, ten-fifths—double size. Any smaller person may be a pawnbroker or a promoter, but not a banker."

Personal qualifications are exacting since banking is a service profession with success dependent on personalities more than on tangible products.

[1] *Banking.* Vocational and Professional Monographs, No. 53. By Albert Griffin. Boston, Bellman Publishing Company, 1945. 28 pp. $1.00.

Industrial Radiology

A Review by J. HARRIS PURKS, JR.

J. Harris Purks, Jr., B.S. '23, A.M. (Columbia University) '25, Ph.D. (Columbia University) '28, is Professor of Physics, Dean of the College of Arts and Sciences, and Acting Dean of the Graduate School.

H. M. Muncheryan (B.S. '33), former Professor of Physics in the California College of Medical Technicians, later Instructor, X-ray Inspection, E.S.M.D.T., at the University of Southern California, is now Chief Physicist, Aircraft X-ray Laboratories, Huntington Park, California. Mr. Muncheryan states that the purpose of his latest book[1] is "to explain industrial radiography in such a manner that it can be readily understood by various laymen in the field."

His reference text is a significant addition to the literature of an industrial field which has grown rapidly in importance and in scope in recent years. Those who entered industrial radiography for the first time with the beginning of expansion of war-related industries found reference material to be scarce and incomplete. General texts in pure science treat the subject of X-rays superficially, and reference texts devoted entirely to X-rays assume a prior extensive mastery of pure science and mathematics. References to the techniques of industrial applications had become out-of-date with the increasing tempo of activity. Workers were faced with months of study of pure science and rule-of-thumb procedures outlined by manufacturers of X-ray equipment before acquiring the sense of mastery necessary to meet urgent war needs.

Mr. Muncheryan assembles in one volume the essential background of pure science necessary to competence in radiology, whether applied to industry or to medicine, and takes up in detail the subject of industrial radiography. True to the author's purpose, the text contains typical problems worked out clearly, step by step, and is illustrated by 179 appropriately chosen figures. In reading the text one gets the impression that a talented lecturer is simply talking to the reader in precise and understandable language, that the author has anticipated questions which would arise in the thinking of the novice.

[1] *Industrial Radiology and Related Phenomena.* By H. M. Muncheryan. Huntington Park, California, Aircraft X-Ray Laboratories, 1943. xx, 539 pp.

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